

- W6CF -



AMSAT

TM Affiliated with



NEWSLETTER

Issued quarterly by the Radio Amateur Satellite Corporation

Volume VIII

Number 1

March 1976

\$1.00



AMSAT NEWSLETTER, published by the Radio Amateur Satellite Corporation (AMSAT), with offices at 700 Seventh St., S.W., Apt. 226, Washington, D.C. 20024 U.S.A. Printed in the U.S.A. Please address all correspondence to AMSAT, P. O. Box 27, Washington, D.C. 20044 U.S.A.

Telephone: (202) 488-8649.

Editor: Joe Kasser, 11532 Stewart Lane, Silver Spring, MD 20904 U.S.A. Telephone (301) 622-2194.

Subscription Price: \$6.00 per year, inseparable from \$10.00 membership dues.

Opinions expressed by contributors do not necessarily reflect those of AMSAT.

Material published in the AMSAT NEWSLETTER may be reproduced without specific permission, provided that credit is given to the source.



DEADLINE for copy for
next Newsletter is
12 May 1976

AMSAT OFFICERS

- President:
Perry I. Klein, K3JTE
- Executive Vice President:
Jan A. King, W3GEY
- Secretary:
Bob Carpenter, W3OTC
- Treasurer:
Roy Rosner, WB4UOX
Ed Post, W3HKD (Asst.)
- Director of Information
and Publicity:
Joe E. Kasser, G3ICZ
Gary Tater, W3HUC (Asst.)
- Membership Chairman:
Richard Coan, W3CPU
Larry Martin, W3IBO (Asst.)
Robert W. Balcom, W3PZK (Asst.)
- Awards Manager:
Earl Skelton, WA3THD

COVER PHOTOGRAPH

"Kaz" K2ZRO demonstrating the
use of the Satellabe.

TABLE OF CONTENTS

EDITORIAL 3

shoot OSCAR with a Satellabe 6

OSCAR 7B with the AMECO TX-62.....15

Summary of the satellite Broadcast Test..16

Modifying the STE AR10 (ARAC 182) RCVR..17

Individualized AZ/EL coordinates.....18

ORBITAL DATA CALENDAR.....19

AMSAT PHASE III Program.....20

AMSAT STICKERS.....20

Phase III Schedule.....22

Mode B access power tests (grp).....23

AMSAT AREA COORDINATORS (USA).....24

OVERSEAS COUNTRY COORDINATORS.....25

AMSAT Affiliate Organisations.....25

Letters and Comments.....26

Cartoon and Classified.....29

QSL Bureau User's List.....30

QSL Bureau QTH.....31

Membership Renewals 31

OSCAR Satellite Statistics.....32

REFERENCE ORBITS.....

AMSAT NETS.....38

Satellite OPERATING SCHEDULE.....38

Results of the Membership Survey.....39

Spacecraft Transponder Frequencies.....39

Tropical Hamboree.....40

MODE B QRP TEST DAYS.....40

From the Presidents Desk.....41

AMSAT OSCAR 7 Antenna Polarisations....41

A-O 7 2/10 Transponder Bandplan.....41

Board Meeting Minutes.....42

North Jersey Award.....42

More on the EDUCATIONAL PROGRAM.....43

Search and Rescue Experiment.....43

OSCAR AWARDS.....44

OSCAR User Statistics.....45

DO YOU SPEAK OSCAR..BEGGINERS SERIES...46

Slides and Photos.....47

第3巻 第3号 (通巻21号)

JAMSAT

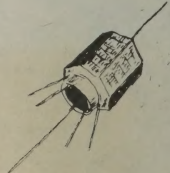
1975年9月25日 発行

AMSAT OSCAR Newsletter

発行人 J A I A N G 米田治雄◎

を145.925-145.935MHzの間で行なう予定です。もし私の
の信号が聞こえたら、正確な日付と時刻 (GMT) の記
録を忘れないでください。他の局の信号に対して同様
をお願いします。

この手紙は、KH6BZF, GRU, 1J, AD,
JA8DJJ, ZL1AZR, VK2ALU, VK3A
TN, ZK1AA, F08DRその他私の知っている7
Bのユーザーに送ろうとするものです。目的は、オスカ
ー7のモードBを使って、明らかに超DXの可能性があ



EDITORIAL

PERSONAL OPINION

So far in my year of editorship the editorials have been passive. This issue I'm going to inflict some of my opinions on you. You don't have to read the rest of the editorial, but if you do, please comment either by letter or by tape cassette (if you have a lot to say).

DEADLINE DATES

Each issue of the newsletter prominently lists a deadline date for contributions for the next issue. Well, when the deadline date arrives and the input box is empty, what is an editor to do? Well, this one calls up the people he knows promised material and politely points out that the deadline has passed and requests the status of the material. Then depending on the state of the material, a decision is made as to how long to slip the deadline date. This means that the newsletter is going to be late. This issue of the newsletter was slipped one month.

The one-month slippage is the longest any newsletter has been delayed, and should not occur again. Please do your part and keep to the deadlines.

WRITING TO AMSAT

AMSAT is an organization staffed by volunteers working on a part-time basis. The people who respond to your letters do so in their "spare" time. Thus, incoming mail is put on their stack and answered as time permits. If a particular person has to go out of town for any reason, there will be an extra delay in answering mail.

Incoming mail at Box 27 is opened and sorted (if the envelope is addressed to a specific person or is marked personal, it is not opened). The sorted letters are then remailed (via the U.S. mail) to the volunteer who deals with that specific type of correspondence. The sorted letters are held for up to a week to allow a sufficient weight to build up to save on postage and to ease the load on the sorter. The bundles are then mailed by second class mail.

The moral of this story is: Do not expect an instantaneous reply to any letter that you send in. When you write in for specific items, such as photographs need for a demonstration, write in as far ahead of time as possible. When you send in several different queries, write them on different sheets of paper and put your name and address on each, allowing your queries to be dealt with in parallel rather than in series.

COMMUNICATION BY RADIO

We are radio amateurs. Radio amateurs tinker with and sometimes communicate by means of radio. Many queries arriving at Box 27 are such that could be answered in one or two sentences in personal communication. Why not use the AMSAT Nets for such queries. There will usually be someone on the air who can answer your question there and then. You will get a speedy reply and the load on the "letter repplier" will be eased. If there isn't someone on the air who can answer, then Net Control can forward your query or phone patch (if allowed) to someone who can. This will save time, effort and money. We are radio amateurs, let's use radio.

LOCAL CHAPTERS

If you answered "yes" to question 4 of the membership survey in the last newsletter, the first thing you should do is contact your local area coordinator. If there isn't one, contact me. Then get together and form a local chapter of AMSAT and share the work. The area coordinator is usually the first one in his area to volunteer. He handles requests for information, demonstrations, bulletins, hamfests and such things, and in some areas the work is getting too much for one person. Thus forming a local chapter is the most effective way that you can help out. You don't even have to do anything formally. Just letting him know that you are available is enough.

SUPER POWER

AMSAT's OSCAR 6 and 7 are designed so that stations running average power output can access the satellites. The answers to question 2 of the membership survey show that most members can overload the spacecraft if their equipment is running at its rated power output and their multielement antennas are pointing anywhere near the spacecraft. Fortunately, most people do not run "super power." Some who do, do so out of ignorance and when they learn that they are running

(continued on page 4)

(continued from page 3)

super power, reduce their power to acceptable levels. Good for them! The same goes for people who operate through the satellites on "OFF" days.

It is super power and operating on OFF days that can reduce the lifetime of the satellites, and AMSAT's OSCAR 6 and 7 have to last us until the Phase III spacecraft is launched in about 2 years' time.

Talking of the Phase III spacecraft there is no truth to the rumor that it will contain a Laser Zapping Experiment (LZE) (The LZE scans the passband, stops on a super power station, attitude control servos zero in the Laser and it zaps the antenna of the super power station).

Several super power stations refuse to reduce power. Recently I visited an area coordinator well away from Washington, D.C. He told me about two super powered stations; I noted their calls to see if they were members. When I got back to Washington, I looked them up and found that they were life members. So, what is the point of being life members if you consistently run super power?

MICROPROCESSORS

Microprocessors have dropped in price to such an extent that it is now economically feasible to use them in the home. Microprocessors and microcomputer clubs are springing up all over the U.S.A. and possibly in the rest of the world as well. In many of these clubs radio amateurs comprise a large number of the memberships and AMSAT members comprise a large number of the active technically orientated radio amateurs.

The Phase III spacecraft contains a microprocessor. the PCM data on the Engineering Beacon will require sophisticated telemetry data processing in the ground station. This is best implemented by means of a microprocessor. Microprocessors have lots of other uses both in the home and in the ham shack. Aside from the home uses, they can be used to control the azimuth and elevation of antennas during OSCAR passes; they can calculate Equatorial Crossing times for AMSAT's OSCAR 6 and 7, and so on.

There are enough microprocessor application notes published so that most engineers and knowledgeable radio amateurs can build up the hardware and get it working within a short period of time.

However, the published notes only allow us to build the hardware and get it working without "reinventing the wheel." That is, the circuits are standard. We copy it (almost), debug it and it works. To get it (the hardware) to do what we want to do, is quite another matter. We have to instruct it to perform its task, and that means writing programs (software). In AMSAT we will be doing similar things with our station microcomputers, and it seems to me that it would be a good idea to set up some sort of software library for AMSAT-OSCAR related programs. The Automated Command and Control Stations for AMSAT's OSCARS 6 and 7 use Intel 8008's and 8080's, and software has been written. We also have a Monitor-Debug package for the 8080 originally developed by Richard Allen, W5SXD. It allows programs to be loaded from paper tape and dumped to a teletype. It also allows registers and memory locations to be examined and changed. It allows breakpoints to be set during program debugging. It is too long to be listed here but will be published in a forthcoming issue of Byte Magazine.

AMSAT is a worldwide organization, and the fact that some software has already been developed for the 8080 in the U.S.A. is no reason to proclaim that the 8080 shall be the AMSAT microprocessor. (A lot of software for the RCA-Cosmac (to be flown on Phase III) has been developed in Germany, and the Australians are working with the National SC/MP unit). The actual choice must be made by each person to suit his particular situation (and will depend on software, availability, cost, etc).

In the same way as we have been publishing announcements of the availability of orbital prediction programs for pocket calculators, we should publish announcements of the availability of software for various microprocessors, and, space permitting, we could publish actual listings (with lots of comments). Hardware designs should be limited to the non-microcomputer section. For example, a published design for a PSK demodulator to demodulate the Phase III Engineering Beacon telemetry data will be limited to the section that provides clock pulses and the reconstructed serial TTL level data stream. Each person can then interface the serial data to his microcomputer by using standard Interface circuits for that microprocessor already designed and published.

This will allow microcomputer users to share software as well as hardware and will allow everyone to build working systems (that actually do things) in a reasonable period of time.

THINKING AHEAD

Almost every day a new call is heard through the downlink of AMSAT's OSCAR 6 and 7. When the Phase III spacecraft is in orbit, the situation will change drastically. No longer will we be limited to 5000 miles, for a whole hemisphere will then come into range. For the first years of operation any station in the Northern Hemisphere will be able to communicate with any other in that hemisphere for up to 15 hours a day as well as with Southern Hemisphere stations for part of the time. This communication facility will be there irrespective of the state of the Sunspot Cycle, Solar Flares and most other phenomena that upset conventional HF band communications.

Consider what that will mean in terms of QRM!

On a "typical" hf band such as forty meters, a number of qso's can take place on one frequency at any time, because depending on the time of day, two stations located in, say, Europe can work each other without hearing two stations in North America also working each other on the same frequency. It would also be possible for more qso's to take place on the frequency causing minimal qrm as long as those other stations are well separated or within the dead zone (skip effect). In fact, this is normal for forty meters.

Now consider two meters. 144.12 MHz is a typical SSB frequency. At any given time many qso's could take place on that frequency, without causing any qrm at all to each other, because of the geographical spacing between the stations in qso and the line of sight properties of 2 meter propagation.

What would happen if the characteristics of forty meters were suddenly super imposed onto the two meter band? . . . Instant QRM! Stations all over half a world would suddenly start hearing one another on the frequency. Local qso's could take place, simply by covering up more distant stations on the same frequency. Dx working would be possible only if no locals appeared on the frequency at either end. Now take away the dead zone, and let the band be open to everywhere at the same time. Everyone is now a "local," and can be heard anywhere else.

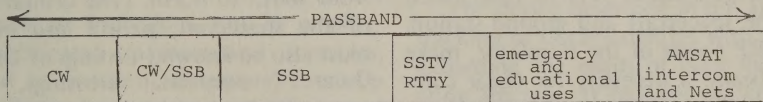
This is what may happen to part of two meters (and 70 cm) when the Phase III spacecraft is in its final orbit. It is up to us to plan ahead to try and control the qrm so that qso's can take place.

A two meter fm repeater puts a station in contact with any other one within, say, 60 miles or so for up to 24 hours a day.

The transponders on AMSAT's OSCAR 6 and 7 increase that range to 5000 miles, but only for 20 minutes or so, three or four times a day. The Phase III spacecraft will put a whole hemisphere in range for up to 15 hours a day. This means that round table qso's between stations in Europe, the U.S.A. and Japan could become commonplace. This would introduce a whole new era in phone patches, traffic handling, emergency communications, and educational uses.

It is these latter uses that will be instrumental in getting a place aboard the launch vehicle for the spacecraft.

It's going to take a lot of planning to ensure that we utilize the Phase III spacecraft in the best way. For a start some sort of band plan such as the one shown below may be required.



G3ZCZ

This is an attempt to split the passband into modes, similar to the voluntary band plans in effect in IARU Region 1 on all amateur bands.

In this plan starting at one end of the passband, there is a cw section, then an ssb section, with an overlap area for mixed mode contacts. The top end of the ssb section and the bottom end of the cw section could be used for traffic and messages where allowed by the licensing authorities. Then follows a segment reserved for sstv and rtty. Another segment is reserved for educational uses including an Emergency Calling Frequency. The last section is a small one reserved for the use of the AMSAT Command Stations as an intercom frequency. It may also

(continued on page 48)

Shoot Oscar with a Satellabe

Communication via Oscar satellites is, in principle, similar to conventional amateur operating procedure. In both cases, one calls or answers CQ, exchanges signal reports and other "vital" information, wraps up the QSO with a 73, and then tries to work somebody else. For communicating over long distances on VHF and UHF bands, large gain antennas are routinely employed. Because such antennas are characterized by a narrow beam-width, they must be accurately aimed toward the station sought.

While in ground-to-ground communications, directing the antenna towards the desired direction is not a particularly difficult task. In satellite work this matter becomes more complicated.

Let's review some of the problems encountered in satellite communications.

1) The large distance (912 to 3000 miles) between the spacecraft and ground station, and the QRP power of the translator, make high gain beams a necessity for Oscar communications, if consistent results are desired.

2) A satellite represents a "moving target" traveling with the velocity of 4 miles per second (14,000 mph), some 912 miles above the surface of the earth.

3) The satellite rises above the horizon several times a day for periods lasting from a few seconds to a maximum of 22 minutes, during which time it becomes available for communications. (Oscar is not accessible beyond the line-of-sight.)

4) The times the satellite rises and sets are different for each geographical location on the earth.

5) The elevation (vertical angle) of the spacecraft, in respect to the tracking station, may, during certain passes, change from 0° to 90° within a period of only 12 minutes. During the same time the azimuth (horizontal angle) may sweep an arc 180° wide.

The above points clearly imply that an Oscar user must follow the satellite with his high gain antennas to secure optimum performance. Consequently, he must know the position of the satellite in respect to his QTH at any time around the clock. This objective can only be achieved by employing some form of satellite tracking method.

The reference point for satellite tracking purposes is the time and longitude at the very instant the satellite crosses the equator from south to north. (The orbital constants of the spacecraft, period and inclination, must also be known.) Listings of Oscar 6 and Oscar 7 equatorial crossings, hereafter referred to as EQX, are published by Amsat, 73 and many other sources months in advance, and are, in general, easily available. Some listings include all daily EQX's, others provide that data for reference orbits only. A reference orbit is the first daily satellite pass which crosses the equator after 0000 GMT.

Once the EQX data becomes available to the Oscar user, it is left to his discretion how to employ it for tracking purposes.

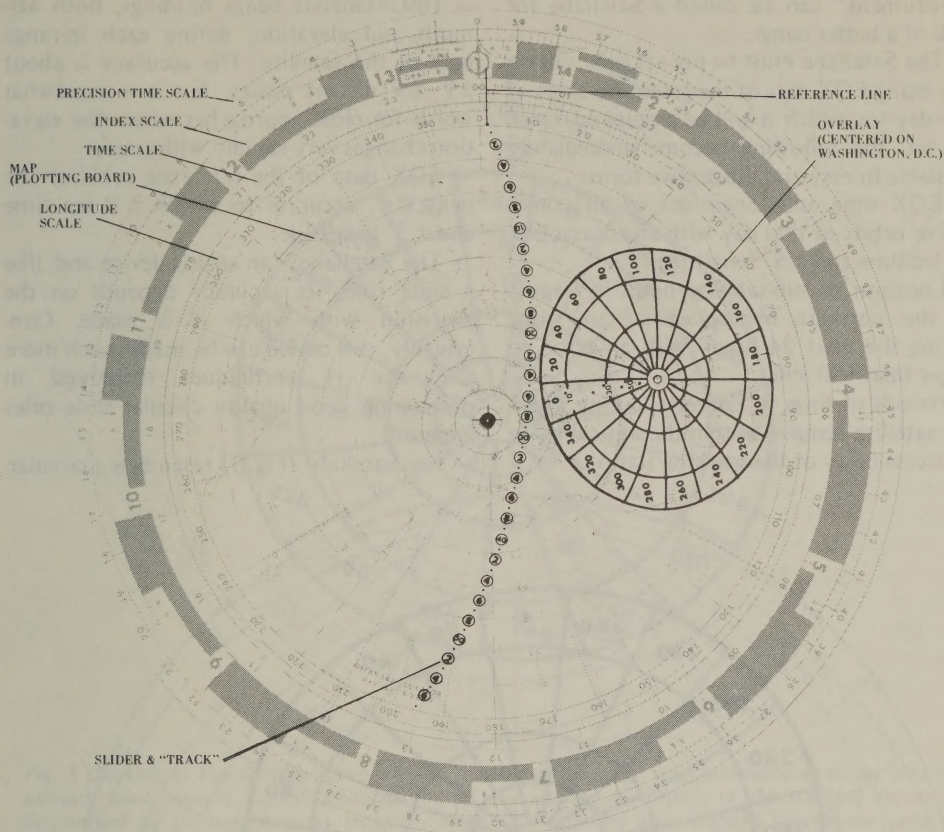


Fig. 1. Total view of Satellabe, showing four concentric scales (Map Plotting Board, Time Scale, Index Scale, and Precision Time Scale), with their relation to each other. The Range Overlay is centered on the QTH of the tracking station. Rotary transparent Slider shows the path and instantaneous location of Oscar in terms of minutes after equatorial crossing. The Slider pivots in the center of the device.

A number of amateurs, lacking adequate tracking facilities, resort to "dead reckoning" — namely, trying to guess the approximate direction and periods of accessibility of Oscar satellites. On the other end of the scale, there are individuals who by employing sophisticated mathematical formulas, processed by modern computers, come up with tracking data which equal those used by NASA.

In the middle, there is a group of Oscar users which has developed all kinds of "private" tracking methods, using globes, maps of different projection, and other ingenious schemes or devices perfectly suitable for their intended purpose. Unfortunately, the remainder of amateurs who own suitable equipment for space communications become so overwhelmed by the

apparent complexity of satellite tracking that, in all probability, they never even attempt to try this new and exciting form of amateur communications.

The device described in this article allows tracking of Oscar satellites with an accuracy exceeding the needs of even the discriminating amateur. It requires no knowledge of the mathematics or astrophysics on the part of the user.

It resembles a circular slide rule 11 inches in diameter with a map of the northern hemisphere in the middle. It operates on the principle of an "astrolabe," an instrument used by astronomers in the ancient times for predicting the apparent movement of celestial bodies as viewed from a particular location on the earth. I feel that this

"instrument" can be called a Satellabe for lack of a better name.

The Satellabe must be pre-set only once a day using EQX data of the reference orbit of the day for which it will be employed. Once pre-set, the following become immediately available in easy and illustrative form:

- EQX time and longitudes of all consecutive orbits of that day with an accuracy of ± 5 sec time and $\pm 5^\circ$ longitude.

- Location of sub-satellite point in respect to the northern hemisphere at any time during the next 24 hours with an error no larger than 100 miles.

- Periods of time, ± 5 minute, during which the satellite remains within theoretical range of accessibility of the tracking station.

- Instantaneous beam headings, both azimuth and elevation, during each in-range pass of the satellite. The accuracy is about $\pm 5^\circ$ for distant passes, but it is somewhat worse for close approaches where the elevation changes very rapidly with time.

- EQX data of the reference orbit of the next day, accurate to within ± 2 sec time and $\pm 5^\circ$ longitude.

The Satellabe is an analog device and, like a slide rule, its accuracy depends on the precision with which it is made. Conceivably, this device can be made much more accurate if techniques employed in developing good quality circular slide rules are used.

The Satellabe (Fig. 1) resembles a circular

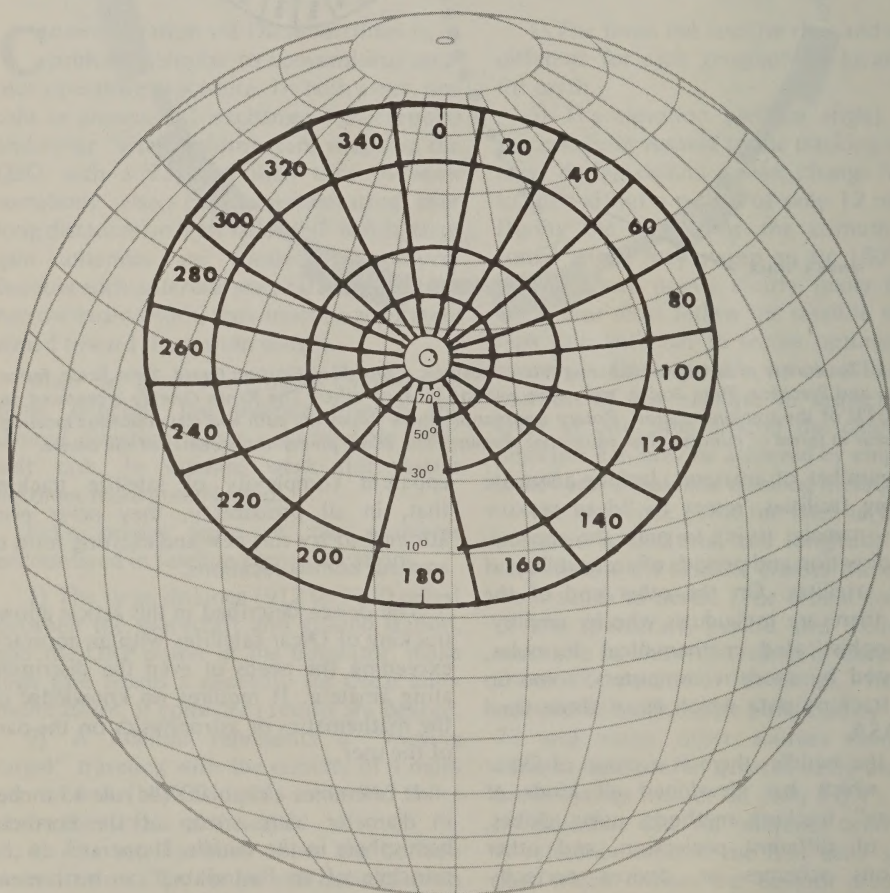


Fig. 2. Range Overlay placed on a globe. The circle represents the area of accessibility of Oscar (2450 miles) from the point in the center of the Overlay. Azimuth lines shown are 20° apart. Concentric circles show the locations where the satellite will be positioned 10° , 30° , 50° and 70° above the horizon of the tracking station; interpolation is used for in-between angles.

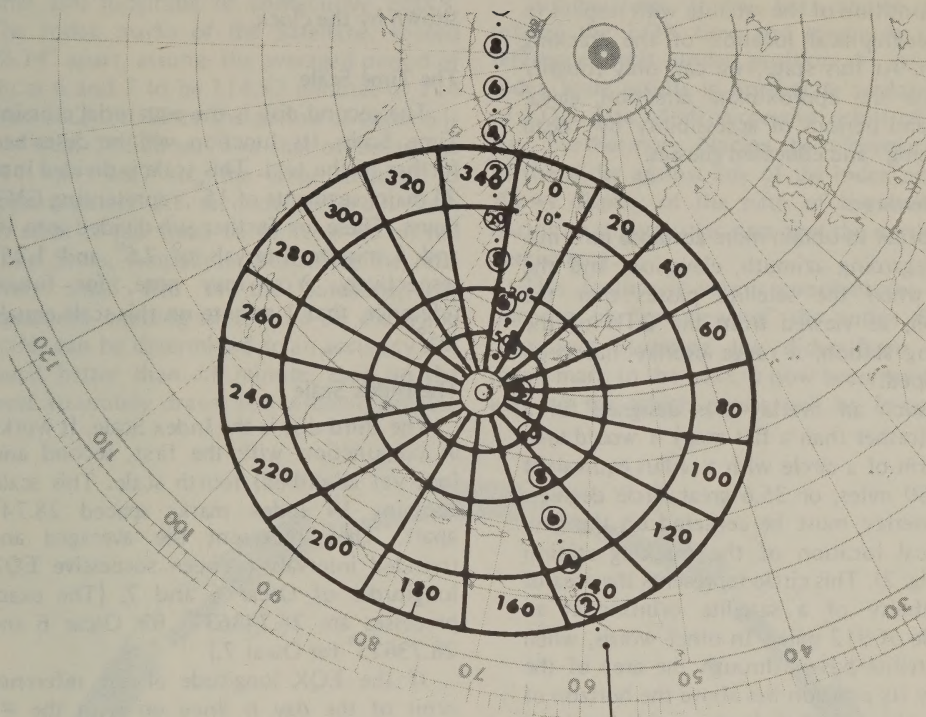


Fig. 3 (Section of Fig. 4). The Range Overlay transposed on a flat map looks like an ellipse; straight azimuth lines become curved. The position of the satellite in respect to the tracking station is determined by its instantaneous location, in terms of minutes after crossing the equator, and by relating it to markings on the Overlay. It can be seen, in this example, that during this pass Oscar will enter the area of accessibility 2.5 minutes after EQX and descend beyond the horizon 24 minutes after EQX. 12 minutes after EQX, for instance, the azimuth will be 100° and elevation 50° in relation to the tracking station.

slide rule. It has 4 scales, one of them representing the map of the northern hemisphere,, and a rotating slider that simulates the "track" of the satellite. In addition, a Range Overlay is provided. This overlay is affixed on the map and must be centered on the user's QTH. All scales and the slider pivot on the center (north pole) of the map.

DESCRIPTION AND FUNCTIONS OF SCALES

The Plotting Board (Map)

The first (innermost) scale depicts a polar projection map of the northern hemisphere with degrees of longitude indicated on its circumference. The map serves as a Plotting Board where the position of the satellite is being determined. A polar graph can be used instead of the map; the map, however, is more illustrative.

The Slider and "Track"

The Slider, made of thin transparent material, represents the "track" (locus of sub-satellite points) of any spacecraft orbiting the earth with a period close to 115 minutes and inclined approximately 102° ; Oscar 6 and 7 and several weather satellites belong to this category. The "track" is so designed that when its Reference Line is set on the longitude of a chosen EQX, the "track" follows the path of the satellite during this particular pass. The numbers printed along the track indicate the location of the satellite after that many minutes from the moment the space craft crossed the equator.

Using the map with the described slider and knowing all daily EQX data is sufficient to plot the location of the satellite at any time during that day. Those informations,

however, are not adequate to determine the exact position of the satellite with respect to the geographical location of the tracking station. At this stage, we can only roughly estimate the approximate direction, elevation, and periods of accessibility by "dead reckoning" and educated guesses.

The Overlay

In order to obtain more accurate information regarding azimuth, elevation, and the time when the satellite passes over the horizon, as viewed from the QTH of the tracking station, a range overlay has been developed.

If such an overlay was designed for a globe (rather than a flat map) it would take the form of a circle with a radius equivalent to 2450 miles, or 35.6 great circle degrees. The overlay must be centered on the geographical location of the tracking station (see Fig. 2). This circle represents the area of accessibility of a satellite orbiting at an altitude of 912 miles. In other words, when the satellite passes through the area of the overlay its position lies above the horizon of the tracking station (not considering local topography) and communication becomes possible. A circle on the globe can easily be divided into azimuth sectors; then, circles of equal elevation angles can be calculated and drawn as shown on Fig. 2.

Due to projection distortion, what is a circle on a globe resembles an ellipse when transferred to a polar projection map; also, straight azimuth lines become curved. With the aid of the overlay, centered on our QTH, we now can easily track the satellite in reference to our geographical location. While following the satellite minute by minute after it has crossed the equator, we may now determine its azimuth and elevation by relating its instantaneous location to the elevation and azimuth marking of the overlay.

The time of accessibility is simply established by noting the time at which the satellite track enters and exits the overlay (see Fig. 3).

HINT: It is very convenient to use an auxiliary clock. If this clock is set to indicate 00 minutes at the exact time the satellite crosses the equator, the numbers on the

slider will directly correspond to the time shown by the clock.

The Time Scale

The second disc is the equatorial crossing Time Scale. Its function will be described further in the text. This scale is divided into 24 major segments of 15° , representing GMT hours. These are further sub-divided into 10 and 5 minute intervals of 2.5° and 1.25° respectively. You may note, for future reference, that 1 minute on this scale equals $.25^\circ$.

The Index Scale

The third disc is the Index Scale. It works in conjunction with the first, second and (not yet described) fourth scale. This scale contains 14 index marks spaced 28.74° apart. They represent the averaged and rounded intervals between successive EQX longitudes of Oscar 6 and 7. (The exact precesses are 28.748637° for Oscar 6 and 28.73625° for Oscar 7.)

If the EQX longitude of the reference orbit of the day is lined up with the #1 index position, the remaining index marks will indicate positions on the equator of all successive EQX of that day. The longitudes of these crossings can be read on the circumference of the map.

The index marks superimposed on the Time Scale (second disc) divide the time into intervals corresponding to the period of a satellite that has a precess that equals the separation, in degrees, of the index marks. Again, if the EQX time of the reference orbit of the day (as read on the Time Scale) is lined up with #1 index position, the remaining index marks will indicate the time of successive EQX's.

The precess and the period of a satellite are directly related to each other. The fact that the earth revolves 360° in 24 hours, or in 1440 minutes, means that any point on the surface of the earth travels with an angular velocity of $.25^\circ$ per minute. Consequently, during one period of the satellite (P) the earth rotates $P/4$ degrees. Therefore, the quantity $P/4$ becomes equal to the precess of the satellite.

The above relation allows using the index marks spaced $P/4^\circ$ apart for indexing both

time and longitude of consecutive EQX's. The index marks of the Satellabe, spaced 28.74° apart, assume the averaged period of Oscar 6 and 7 to be 114.97 minutes or 114 min. 58.2 sec. Since the period of Oscar 6 is 114 min. 59.673 sec. and that of Oscar 7 is 114 min. 56.7 sec, the error amounts to approximately 1.5 seconds per orbit. Such an error is too small to be resolved on the Time Scale. Actually, considering the relatively small size of the Satellabe, the equatorial crossing time, read on the Time Scale, can be determined to an accuracy not much better than ± 1 minute, even on the most accurately drawn and centered devices.

Summarizing: It has been shown that setting the EQX time and longitude of a reference orbit under position #1 of the index scale results in immediate availability of EQX data of all successive orbits of the day. Furthermore, placing the reference line of the slider against any of the index marks allows display of the path of the satellite during that particular pass over the northern hemisphere.

This feature is very convenient for the purpose of "pre-viewing" the entire day's operation. Rotating the slider from one index mark to the next, it now becomes very easy to see which passes will be in-range,

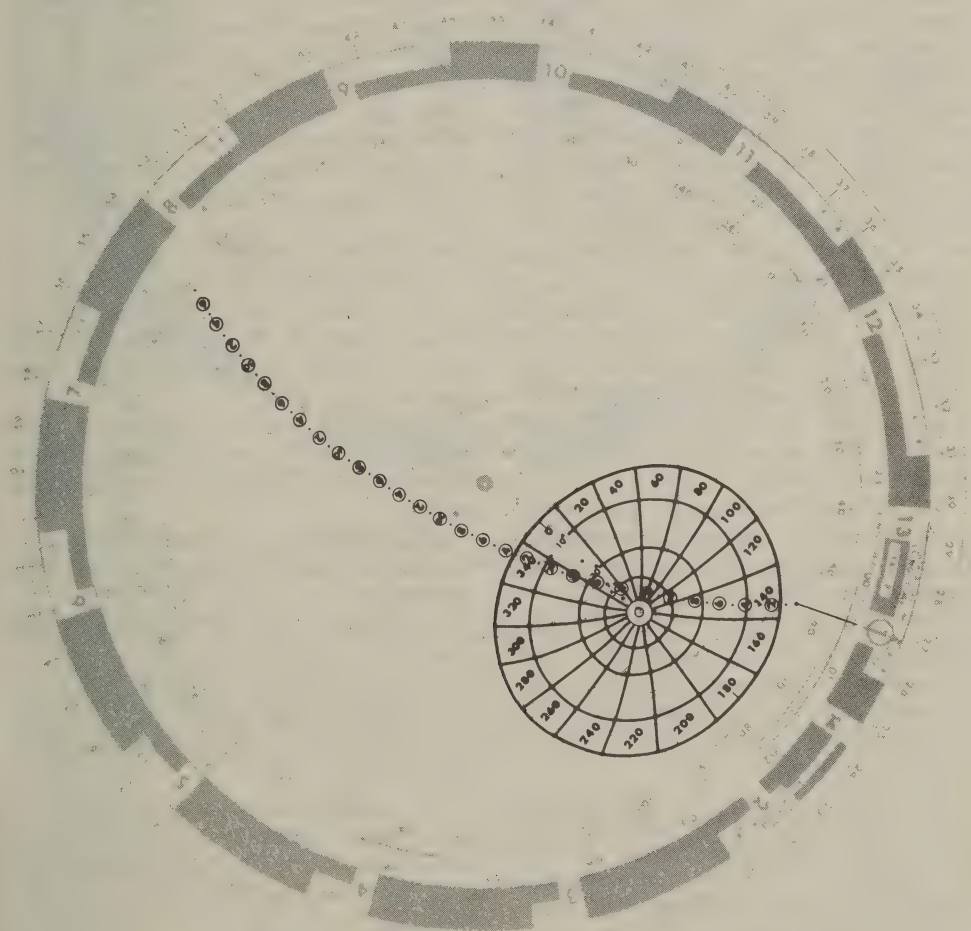


Fig. 4. Setting of the Satellabe for operation on February 24, 1975. The EQX time and longitude of the Reference Orbit are 00:26:54 GMT and 56.6° . The "track" shows the position of the satellite every minute after the spacecraft has crossed the equator.

marginal, or "out of sight." The times of operation will also be easy to pre-plan because the time when the satellite's path enters the overlay can now be clearly estimated. This is particularly convenient for daytime passes, when the satellite appears within range about one half hour after EQX time.

The Precision Time Scale

Estimating the time of successive EQX's with an accuracy of a couple minutes may be quite satisfactory to most Oscar users. Some amateurs, however, would like to have this data available with much better precision. For those who use very high gain antennas, characterized by very narrow beamwidths, an error of two minutes is significant, especially when the satellite passes nearly overhead and its elevation changes rapidly with time. The EQX time inaccuracy of the Satellabe can easily be corrected if orbital predictions of all daily passes are available. Those who have access only to reference orbit data must resort to the pencil-and-paper method.

In order to improve the accuracy of prediction of successive EQX time, the Precision Time Scale has been developed. This scale, the fourth, is divided into 60 sections of 6° each, representing minutes, and is further sub-divided into 10 second segments at 1° intervals.

An additional set of index marks, designated "A" for Oscar 6 and "B" for Oscar 7, has been placed on the outer rim of the index scale and "framed" together with the corresponding original index marks described previously. "A" and "B" index marks will be used to predict EQX time with an error of only a few seconds. This accuracy can be tolerated by even the demanding Oscar users.

In order to predict the time of subsequent EQX's, the rule of thumb in Oscar work is to add 115 minutes, or more conveniently add 2 hours and subtract 5 minutes, to each successive EQX time. Because the exact period of Oscar 6 is 114 minutes 59.673 sec. and of Oscar 7, 114 minutes 56.7 seconds, the "rule of thumb" results in an error of about .3 sec. and 3.3 sec. per orbit for Oscar 6 and 7 respectively

This error may appear trivial; nevertheless, it amounts to more than 40 seconds per day for Oscar 7.

Index marks "A" and "B" are so arranged around the Index Scale as to subtract 5 minutes .3 seconds and 5 minutes 3.3 seconds from the successive EQX time of Oscar 6 and 7. It should also be mentioned that additional marks can be placed for other satellites having different orbital periods.

To use the Precision Time Scale, the minutes and seconds of EQX time of the reference orbit are set against the #1 position of the index scale. Then, the minutes and seconds of all daily equatorial crossings are read *above* marks "A" for Oscar 6 and *above* "B" for Oscar 7 on the Precision Time Scale. The "A" and "B" marks are "framed" together with corresponding precess index marks for easier identification. The hours of EQX time are read on the Time Scale as described previously.

How To Use The Satellabe

Let us try an example:

The tracking point is Washington, D.C., located at latitude 39° N. and longitude 77° W. The overlay is centered on the above coordinates.

The orbital data for February 24, 1975 indicates EQX of the Reference Orbit of Oscar 7 to be 00:26:54 GMT and longitude 56.6°.

The Satellabe is set as shown on Fig. 4.

Lined up under the Reference Line of the Slider are:

EQX longitude 56.6° at the equator of the map;

EQX time 00:27 GMT — Time Scale;

#1 position of Index Scale;

26 min. 54 sec., on the Precision Time Scale (fourth disc).

Analyzing the first pass we see that:

1) Acquisition of Signal (AOS) will occur 2.5 minutes after EQX, beam heading 145°.

2) Beam headings during the pass will be:

MINUTES AFTER EQX	AZIMUTH	ELEVATION
5	142°	10°
7	140	20
9	135	30
10	130	40

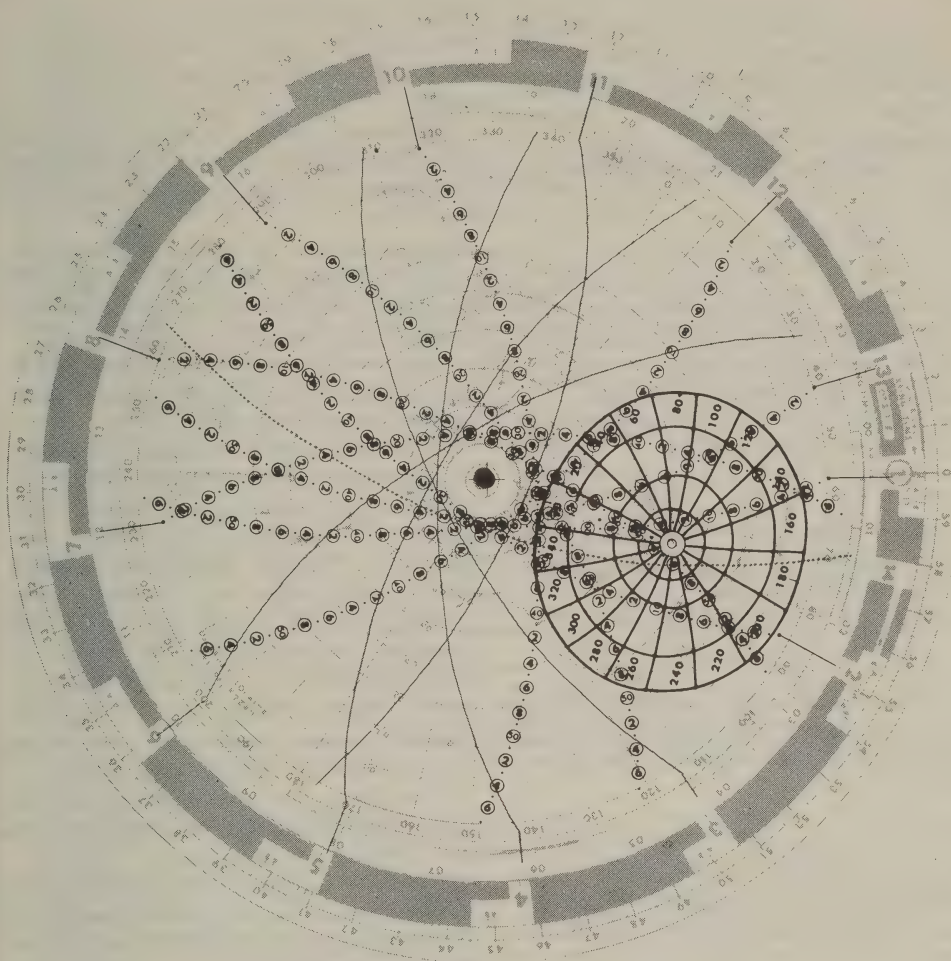


Fig. 5. This drawing may look rather "messy"; nevertheless, it shows all passes of a satellite over the northern hemisphere during one GMT day. Orbits not in-range of the tracking station are shown as solid lines. Moving the Slider through consecutive Index Marks allows recognition of in-range passes and time of AOS and LOS for each orbit. Overhead and marginal passes can easily be recognized. EQX longitude of each pass is read under the corresponding Index Mark; the approximate EQX time is read on the Time Scale opposite Index Marks; the exact time (minutes and seconds) is read on the Precision Time Scale above marks "A" or "B" for Oscar 6 and 7 respectively. The Reference Orbit of the next day is Orbit 14 in this example, because it is the first pass that occurred after 0000 GMT. Setting the values of EQX time and the longitude of the 14th orbit under the Index Mark #1 makes the Satellite available for the next day's operation. On alternate days pass #13 will be the next day's Reference Orbit.

12	105	50
13	70	60
14	40	60
15	20	50
16	10	40
18	355	30
19	355	20
21.5	350	10
24	350	0

minutes after EQX at azimuth of 350°.

Now we will preview the whole day's operation.

Without disturbing the original setting of all scales (locking them with a paperclip works fine) we place the Reference Line of the Slider against each consecutive index mark and draw the following conclusions (see Fig. 5):

3) Loss of Signal (LOS) will occur 24

Orbit 2

EQX: 02:21:51 GMT; use marks "B" for Oscar 7; longitude 85.5°;
Pass within range; AOS-2 min., LOS-22 min. after EQX;
Beam heading 200°-320°;
Closest approach 11 min. after EQX, elevation 30°.

Orbits 3, 4, 5 and 6

Out of range.

Orbit 7

Pass in range; EQX: 11:56:38 GMT; 229°;
Looks like a good pass to work Europe;
AOS-37 min., LOS-55 min. after EQX;
Beam heading 40°-145°; closest approach elev. 20°, 46 min. after EQX.

Orbit 8

Pass within range, almost overhead, close to 90° elevation 45 min. after EQX;
EQX: 13:51:34 GMT; 258°;
AOS-34 min., LOS-56 min. after EQX.

Orbit 9

Pass in range; EQX: 15:14:30 GMT; 287°;
AOS-33 min., LOS-50 min. after EQX;
Closest approach 42 min. after EQX, elevation 20°.

Orbit 10

Marginal pass; EQX: 17:41:28 GMT, 316°;
Probable AOS-34 min., LOS-46 min. after EQX, provided the horizon is virtually at 0° elevation.

Orbit 11

Out of range.

Orbit 12

Pass in range but just about over the horizon;
Good for working Eastern Europe;
EQX: 21:31:20 GMT, 13°;
AOS-16 min., LOS-24 min. after EQX;
Beam heading — horizontal throughout the entire pass, azimuth 60°-10°.

Orbit 13

Pass in range; EQX: 23:26:17 GMT; 41.5°
(Note that "A" and "B" marks for Orbit 13 are located to the left of index mark #1 and are labeled "13");
AOS-55 min., LOS-25 min. after EQX.

Orbit 14

Pass in range; EQX: 01:21:11 GMT; 70.5°.
(Note that "A" and "B" marks for Orbit 14 are located near index mark #2 and are labeled "14".)

Because the EQX of Orbit 14 occurred after 0000 GMT it becomes the Reference Orbit of the next day, namely, February 25, 1975.

Using the data of EQX of this orbit, we set those values (01:21:11 GMT and 70.5° longitude) under index #1 and the calculator is ready for the next day's operation.

The next day's Reference Orbit is either Orbit 13 or 14 of the present day, whichever occurs first after 0000 GMT.

The above example illustrated the simplicity of operation and ease with which the Satellabe can be used for tracking Oscar satellites. All tracking information is presented in a readily understood pictorial form, which makes this device a good teaching tool. The analog operation of the Satellabe, and particularly the ability of pre-viewing the entire day's operation is, I dare say, easier to apply and interpret than computer generated rows of numbers containing essentially identical information.

Familiarity with the Satellabe may yield more information than is presented in the text. Here are a few examples:

1) Using additional overlays centered on different locations of the world would allow one to recognize if that area is workable via Oscar (overlays overlap).

2) All accessible locations can be worked only if the satellite's track passes through the overlapping sector of both overlays. The EQX longitudes and the time of accessibility can be easily predicted ahead of time.

3) The maximum communication range from any location on the northern hemisphere can be established.

4) Using a "movable" overlay, one may track the satellites while mobile and traveling large distances in a short span of time (such as aeronautical and maritime mobile).

5) The satellabe is easily adaptable for tracking satellites other than Oscars which circle the earth in similar orbits.

... K2ZRO

Although this article is directly concerned with the Ameco TX-62, it should be of equal interest to users of other two-meter CW transmitters of roughly equal power, such as the Johnson 6N2. Basically, the Ameco TX-62 is a crystal-controlled transmitter for two and six meters which is capable of CW and AM operation, using a 7984 Compactron in the final. In two-meter CW operation, it runs from 75 to 90 watts input, depending upon loading conditions, and provides approximately 40 watts output (The author's TX-62 measures 43 watts into a 50-ohm dummy load). VFO operation is also possible using the outboard Ameco VFO-621, or other source of 8 MHz or 24 MHz excitation.

After comparing the two most common ways of developing 432 MHz output, i.e., converting a surplus FM strip or multiplying from two meters by means of a varactor tripler, the author decided on the latter approach. Enough two meter output is available from the TX-62 to permit mounting the varactor unit outdoors, at the antenna. By so doing, the transmission line run may be made at two meters, rather than at 432 MHz where greater losses are likely. Hence, the TX-62/varactor combination is capable of generating more power output at the antenna than the typical FM strip which, because of its size, must generally be positioned in the shack with a long run of coax to the antenna. The varactor tripler unit is small, may easily be weatherproofed, and of course, requires no power other than the two meter drive. It is ideally suited to antenna mounting.

The author procured a suitable unit from Microwave Modules in Liverpool, England¹ (Model MMV432, £17.50 exclusive of VAT, something under \$40 at present rates. A 25% tax is applicable on orders within the UK)* Similar units are available from Spectrum International in Concord, Massachusetts.² (Model MMV432, \$75.20), or may be constructed as described in The Radio Amateur's Handbook. All of these units are rated at 20 watts input, 14 watts output. These ratings are, of course, for continuous duty as in FM service. In practice, the author's unit performs satisfactorily with 30 watts CW drive, yielding approximately 15 watts output to the antenna. W2LV has obtained similar results from a Handbook unit. With 100 feet of RG-8/U (4.8 dB loss) and a perfect match, over 45 watts output in the shack would be required to equal this usable power figure, which is well beyond the capabilities of most commonly available FM strips for 450 MHz. The tripler unit was weatherproofed using a layer of aluminum foil, followed by a layer of electrical tape and a generous helping of caulking material to coat the outside. It was then mounted directly at the 432 MHz antenna, and a transmission line run from the TX-62 to its two-meter input. The above power output figures were measured.

Two problems immediately came to light once this was done. First, the multiplication factor of 54 proved to be too much for the VFO-621, and considerable instability resulted. With crystal control, this problem no longer existed and a reasonable, almost-T9 note could be had at 432 MHz with the TX-62 spotting switch in the "on" position. Fortunately, the 54-times multiplication from 8 MHz crystals lends itself perfectly to a crystal-pulling VXO of the type designed by W1FTX.³ A slightly modified version of this was constructed by the author. The TX062 drive control potentiometer was removed and a fixed-resistance divider substituted, with values selected to give 4 milliamperes grid drive with the crystal puller in use. A 50 pF variable capacitor was mounted in the front panel hole vacated by the drive control and placed across the crystal socket. With a surplus FT-243 crystal, one swish of the capacitor provides enough frequency excursion to cover almost the entire Mode B passband. This arrangement is extremely stable and may be calibrated directly on the front panel with excellent resettability, even from one day to the next. One problem gone.

The second problem was the degradation of two meter reception caused by the proximity of the TX-62 and its feedline to the receiving converter and the two meter antenna. With an expensive MOSFET converter having a noise figure of less than 2 dB, absolutely no OSCAR signals could be heard with the TX-62 key down, making it impossible to monitor the downlink. A workable solution was found for this problem: vacuum tubes. Two elder tube-type units were substituted for the "newfangled" solid-state converter -- an Ameco CN-144 converter and a Clegg Interceptor VHF receiver. Both employ Nuovistor front ends, and both were relatively free from overload problems. Full break-in operation with downlink monitoring was now a reality. If further measures are needed to reduce two-meter overload, the antennas may be separated either in space or in polarization. Because the author has only one rotator, the latter method is used. The 432 MHz antenna is horizontally polarized, while the 145 MHz receiving antenna is vertically polarized.

(* but not to export orders--i.e., to U.S.A. ... ed.)

¹ Microwave Modules Limited, 11 Cranmore Ave., Liverpool L23 0QD, England.

² Spectrum International, Box 1084C, Concord, Massachusetts 01742, U.S.A.

This firm also markets a higher-power varactor unit rated at 75 watts two meter input, model MMV432H, at \$122.80.

³ Smith, "VXO for OSCAR 6," (Hints and Kinks), QST, June 1973, p. 48.

SUMMARY OF THE A3H AND F3 MODE SATELLITE BROADCAST TESTS

BY DR. A. GSCHWINDT, HG5BME

According to the previously arranged plan the Hungarian Radio Amateur Society (MRAS) organized a series of tests to investigate the feasibility of the OSCAR satellites for broadcast transmissions.

The programs included only unprocessed speech as AMSAT does not agree that music should be used.

The following conclusions are obtained from the tests.

A3H Mode:

The test was radiated only by O-7 on 8 October 1975 due to some difficulties with the uplink transmitter on 5 October.

The uplink power was 160W pep. The transmitter output power is multiplied by 10dB antenna gain giving 1.6kW erp.

Three reports were received from DL3SX, DJ9UI and DJ7SW.

The general conclusion is that a very high (8-10dB) receiver antenna gain is required to receive this mode of transmission by envelope demodulation during high elevation orbits.

We shall try to modify our test using O-6 where the on board receiver has higher sensitivity for a given downlink output power.

Further we will radiate a pilot carrier ssb transmission also to ensure better power utilization and to give a reference for Doppler correction. In this case the envelope detectors are not good for reception, only the product detectors are suitable.

The first test will be carried out during predetermined orbits (experimental days) and after the conclusion of the test amateur operators will be invited to give more comments.

F3 Mode:

In the morning and evening of 15 October 1975 the same program as for the A3H tests were radiated by the O-7 repeater.

The uplink consists of 18W transmitter output increased to 360 W erp by a 13dB helix antenna.

The peak frequency deviation was 15kHz.

We received reports from 17 stations including 5 tape recordings. Most of reports consist not only of simple numbers for signal strengths but also a lot of very interesting and helpful comments.

DL8DF; DK5VW and DJ9DTA were able to record the test transmissions with good quality. DJ9DTA sent not only very good recordings but also recordings reproducing the variation of the signal strength in the downlink.

Many thanks to the following amateurs who sent reports and comments on the FM tests:

DL2RM	DK7FJ	DJ9DTA	G8BCL/M	OE3GMB
DL8DF	DK5VW	FLDDL	DL-NØ1-1492370	
DK7JQ	DKØTA	DC5ZL	DM-EA-7143/N	
YU10IN	DB3FE	DM5UJL	GM8APX	

The received signal strength was adequate but the 15kHz deviation was too wide.

The first test with modified parameters was carried out on 10 December 1975. The peak frequency deviation was only 4kHz. Our own measurements indicate that this mode gives much better results.

So, we will try to continue our tests further on O-7 Mode B on experimental days with decreased deviation giving lower threshold for fm detection. In this case all fm amateur equipment will be suitable for distortion free reception.

To improve the readability of the speech during reception a complex speech processing will be added including an audio compressor and a radio frequency clipper.

(continued on page 17)

MODIFYING THE ITALIAN STE ARI0 (ARAC 182) RECEIVER FOR AMSAT-OSCAR RECEPTION

The AR10 (ARAC 182) receiver made by S.T.E., via Maniago, 15-20134 Milano, Italy, is a small, compact receiver with self-contained speaker and operating from 12VDC. It covers 28-30 MHz and 144-146 MHz and has detectors for AM, FM and SSB, an automatic noise limiter and squelch.

The 2-MHz wide coverage of the basic receiver is too wide for OSCAR reception, but the receiver can be modified to limit the coverage to 29.38-29.55 MHz and 145.80-146.00 MHz by the following simple changes:

(1) To the left of the three-section main tuning variable capacitor (CV1, CV2, CV3) are three short jumper wires (labeled "A," "B" and "C" in the parts placement diagram for the AR10 receiver board). These jumper wires are visible on the top of the board, and should be cut and replaced with 5pf capacitors (3 required; mica or disc capacitors will do). All soldering can be done at the top of the board, which needn't be removed from the case.

(2) Readjust trimmer capacitors C3, C8 and C9 located to the left of the variable tuning capacitor, and also L6 (the slug-tuned coil located in front of the crystal) for correct tuning range (29.38-29.55 MHz) and best sensitivity.

(3) Change the crystal in the two-meter converter board (board AC2) to 38.833 MHz (series resonant), so that 145.9 MHz will be converted to 29.4 MHz.

* * * * *

(continued from page 15)

It has been suggested that the solid-state converter might continue to be used if a cavity-type bandpass filter were placed ahead of it. The author did not try this, because no such filter was available. However, based upon published specifications, the insertion loss from such a filter would be such as to degrade the system noise figure of the MOSFET-unit-plus-filter approximately to that of the Nuistor unit alone. Also, the MOSFET-plus-filter would still not have the dynamic range of the tube-type unit, important in urban areas with lots of two-meter activity. Further, good tube-type converters are available quite inexpensively, while cavity resonators are expensive and critical of tuning. Because Mode B is so strong, good signals could be had with the tube-type converter down to the horizon, with beams having four and eight elements.

So, there it is. As may be apparent, this system did not spring full-blown from the mind of some brilliant designer, but rather evolved by trial-and-error over a period of six months. Starting with a TX-62 and doing no building other than the VXO modification, the author got on Mode B for less than \$100, including varactor tripler, two meter converter, 432 MHz antenna and feedline. Should the reader build his own gear, the same could be accomplished for less than half that figure. While cost figures are comparable for the surplus FM approach, usable power output of the varactor system is substantially higher, wherever long runs of feedline are required. The principal disadvantage of this approach is, of course, no SSB. It is a CW-only system. A suitable SSB transverter may be had by using a surplus FM strip to generate 460 MHz drive, then feeding 28 MHz SSB to the final stage and tuning the plate circuit to 432 MHz. Several local amateurs use this method, including W2BXA and W2LV. However, no more than 10 to 15 watts output results at 432 MHz, which after feedline losses is not really enough (disagree-ed.) to access Mode B using SSB under usual conditions and an outboard linear amplifier must be employed. By contrast, 15 watts at the antenna has generally been found to be sufficient for Mode B access on CW, using an eleven-element beam.

The author wishes to thank WA2JSW for his invaluable assistance in this project, and also W2BXA and W2LV for their constant encouragement.

(continued from page 16)

The test transmissions will be radiated regularly from February 1976 using the Mode B on experimental days.

We have had a lot of difficulties with amateurs causing QRM during our test. Will all amateurs please not use the satellite on experimental days. Please remember that the results of our tests will help obtain more allocations for the satellite service in the future.

We are inviting all amateur operators to take part in these tests by sending reports, comments and recordings to HG5BME.

INDIVIDUALIZED AZ/EL COORDINATES IN MINUTES

BY EARL F. SKELTON, WA3THD

At one time the possibility of having personalized satellite orbital data required either access to a large electronic computer or a well greased slide-rule and plenty of stamina. However, with the advent of programmable pocket-calculators, individualized AZ/EL coordinates for a given pass can now be run off in a matter of minutes. The details of a program written for the Hewlett-Packard HP-65 calculator have been available for some time¹ and based on the number of requests for the coding steps, it seemed that it might be appropriate to reproduce the salient features of that routine for those interested in writing their own program. (Copies of the HP-65 program will still be provided upon request and a sase.)

As a preface to these comments, it is noted that there are a number of excellent articles concerning OSCAR's whereabouts already published. These range from some of the earlier fundamental articles, such as those by William Danielson and Sheldon Glick² and Larry Elder, WB6MVK³, to the more recent generalized comments of Peter Thompson.⁴ Although many users monitor OSCAR's trajectory by means of various map overlays, e.g., the nomograph developed by Katashi Nose, KH6IJ,⁵ others prefer a more mechanized procedure, cf. Ref. 6 and 7.

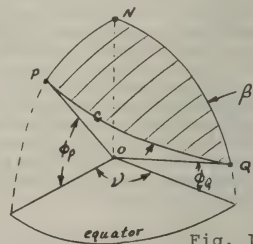
The procedure followed here involves three steps for each set of desired coordinates: for a given time interval following an ascending node, the routine (1) computes the earth coordinates of the subsatellite point (SSP), then (2) solves the spherical triangle formed by the Earth's pole, the SSP, and the position of the ground station (QTH) for the value of AZ, and finally, (3) computes EL from the plane triangle formed by the Earth's radials and the line of sight from the QTH to OSCAR. In greater detail, the steps are as follows:

(1) The latitude ($= \phi_P$ in deg. N) and longitude ($= \phi_P$ in deg. W) of the SSP at T minutes following the ascending node are determined by combining the motion of OSCAR with the rotation of the earth (which is assumed to be spherical). The appropriate expressions are given in Ref. 2 and are repeated here for convenience:

$$\phi_P = \arcsin\{\sin\alpha \sin(2\pi T/P)\} \quad (1)$$

$$\gamma_P = \gamma_X + \{\arcsin\{\cos(2\pi T/P)/\cos \phi_P\} + T/4\} \quad (2)$$

where α is the inclination angle, P is the period (in minutes), and γ_X is the longitudinal coordinate of the ascending node (in deg. W).



(2) The spherical triangle formed by the Earth's pole, the SSP at time T, and the QTH is shown in Fig. 1. The angle v is simply the difference between the two longitudinal coordinates, i.e.,

$$v = \gamma_P - \gamma_Q \quad (3)$$

The angles c and α are found using the law of cosines for the sides of the spherical triangle NPQ:

$$c = \arccos\{\sin \phi_P \sin \phi_Q + \cos \phi_P \cos \phi_Q \cos v\} \quad (4)$$

$$\beta = \arccos\{(\sin \phi_P - \sin \phi_Q \cos c)/(\cos \phi_Q \sin c)\} \quad (5)$$

(Continued on page 47)

where it is noted that ϕ_P and ϕ_Q are the complements of the angles NOP and NOQ. The azimuthal heading (AZ) can be obtained directly from Eq. (5) by considering the relation between γ_P and γ_Q , i.e.,

If $\sin v < 0$, then $AZ = \beta$ (6)

If $\sin v > 0$, then $AZ = 360 - \beta$ (7)

(3) Finally, the Earth's radials to the satellite at time T AND TO THE QTH, together with the line-of-sight from the QTH to the satellite form a plane triangle as shown in Fig. 2.

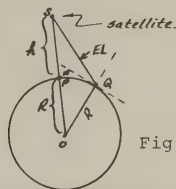


Fig. 2

The law of sines can be applied to this triangle to yield the following expression for the elevation angle, EL:

$$EL = \arctan\left\{\left(\cos c - \frac{R}{R+h}\right)/\sin c\right\} \quad (8)$$

where R and h denote the Earth's radius and OSCAR's altitude, respectively.

The foregoing operations can be stored within the 100-step memory of an HP-65 calculator and executed in a matter of seconds. Thus, a full set of individualized AZ/EL coordinates can be generated for any given pass, i.e., any given value of γ_x , within a few minutes.

REFERENCES:

- ¹E. F. Skelton, *AMSAT Newsletter*, June '75, p. 26; *73 Magazine*, Oct. '75, p. 11; *Ham Radio*, Jan. '76, p. 71.
- ²W. Danielson and S. Glick, *QST*, Oct. '69, p. 54.
- ³L. Elder, *QST*, Mar. '70, p. 50.
- ⁴P. Thompson, *QST*, Nov. '75, p. 29.
- ⁵K. Nose, *QST*, Mar. '74, p. 40.
- ⁶J. E. Mckin, *QST*, May '74, p. 11.
- ⁷A. A. Simpson, *QST*, May, '74, p. 13.

AMSAT-OSCAR 6 AND 7 ORBITAL DATA CALENDAR

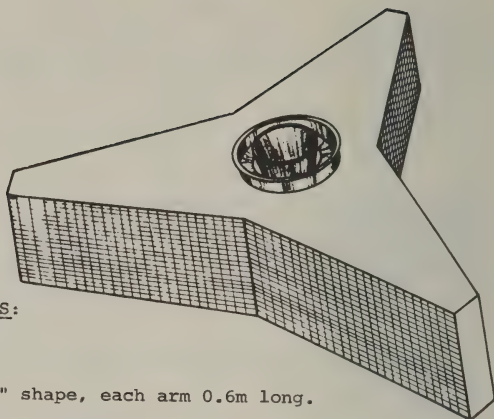
In cooperation with AMSAT, for the second year Skip Reymann, W6PAJ, has published an AMSAT-OSCAR orbital data calendar containing all orbits for 1976 for both AMSAT-OSCAR 6 and AMSAT-OSCAR 7. Designed so that it may be hung on the wall, the calendar includes information on the operating schedules and frequencies for both spacecraft, and also the telemetry decoding equations. Also included is step-by-step information on how to determine times of passage of the two satellites.

The orbital data calendar is available postpaid for \$3.00 U.S. funds or 20 IRC's. Overseas orders will be shipped via airmail. Orders and payment should be made to:

Skip Reymann, W6PAJ
P. O. Box 374
San Dimas, California 91773 U.S.A.

All excess receipts over costs benefit AMSAT.

AMSAT PHASE III PROGRAM



SPACECRAFT CHARACTERISTICS:

Weight: 120 lbs.

Configuration: "Tri-Star" shape, each arm 0.6m long.

Primary Experiment: Two hi-efficiency, hi power (50W) communications transponders.

Power System: 40W B.O.L.* from body mounted solar arrays
eclipse operation from NiCd battery.

Propulsion System: Small perigee kick motor will be utilized
to modify Delta Orbit.

Attitude Control System: Spinning spacecraft (≈ 120 RPM);
attitude will be controlled by magnetic torquing near perigee to adjust
spin rate and axis orientation. Sun
and Earth sensors will be employed.

Miscellaneous: All onboard functions controlled by spacecraft
microcomputer.

FINAL ORBIT CHARACTERISTICS:

Apogee (h_a) $7.1 r_e$ (39,000 KM)

Perigee (h_p) $= 1.228 r_e$ (1460 km)

Inclination (i) 101.5°

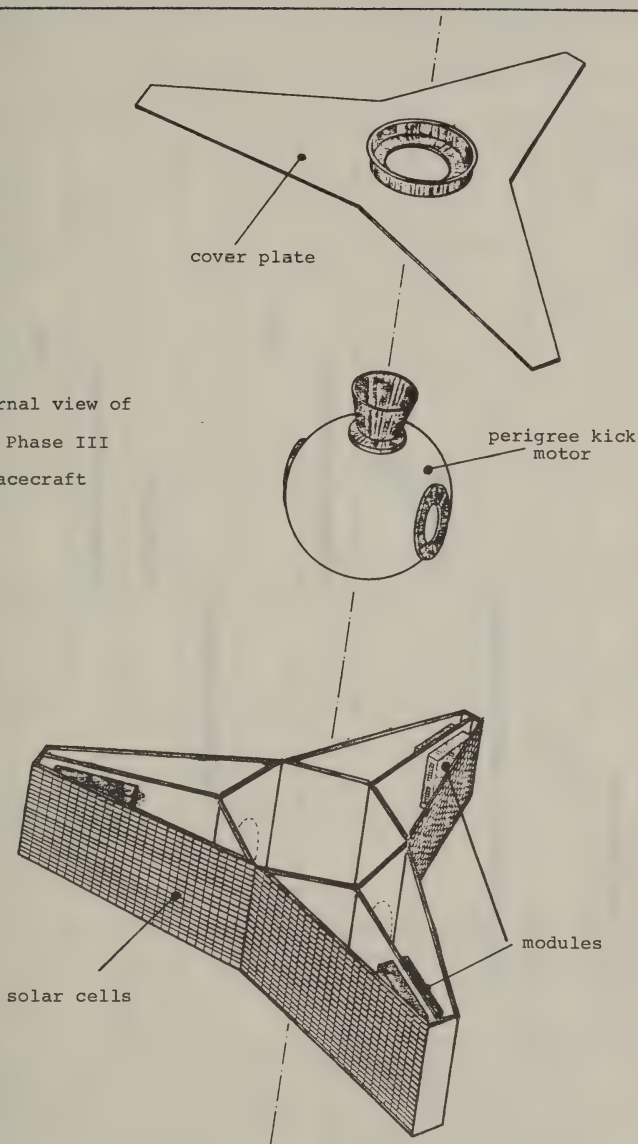
ar

These stickers are printed in black on a fluorescent red background. They are pressure sensitive and will stick to anything including QSL cards and envelopes.



They come in sheets of 48 and may be obtained from David Middleton, W7ZC, Box 303, Springdale, Utah 84767, for only \$1.25 postpaid.

Internal view of
the Phase III
spacecraft



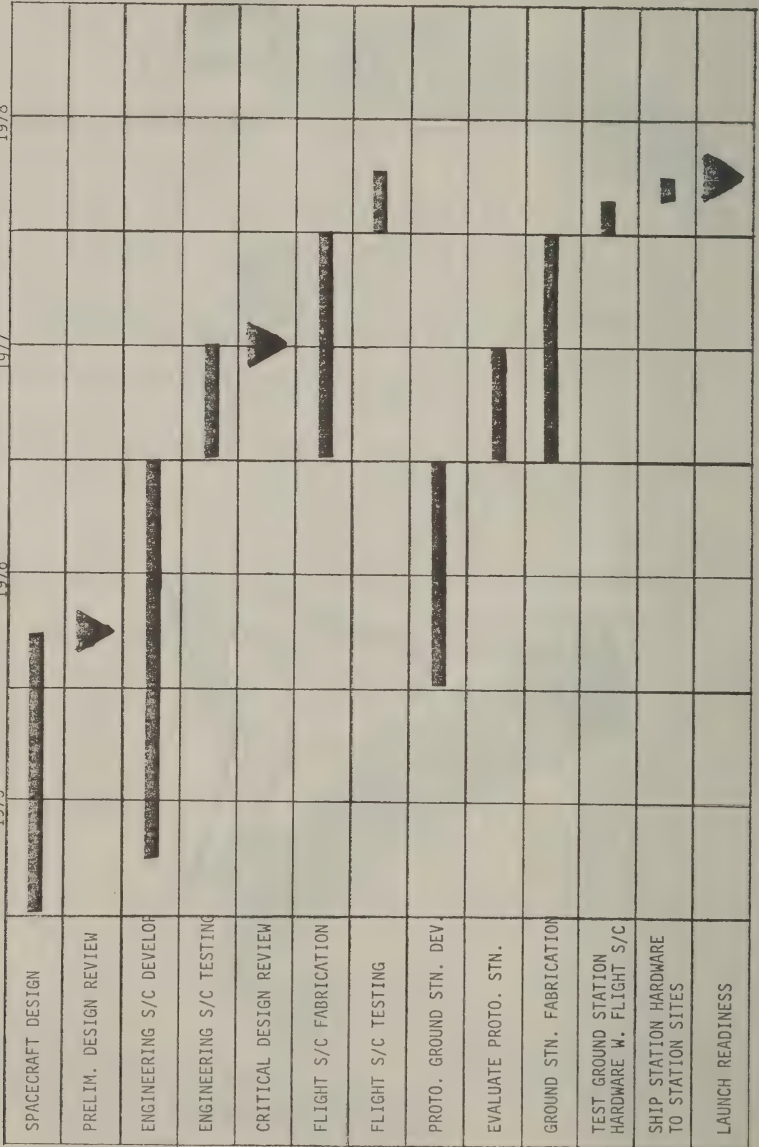
AMSAT - DL	
Zeichn. Nr 3035-2	AMSAT - OSCAR PHASE III
gez. Gladisch	
Datum: 27. 8. 1975	

PHASE III SPACECRAFT SCHEDULE

This schedule shown below is a preliminary one and has no meaning apart from illustrating the complexity of planning, construction and testing that is going into the Phase III spacecraft. Since this schedule was first published, several items have slipped and others have advanced.

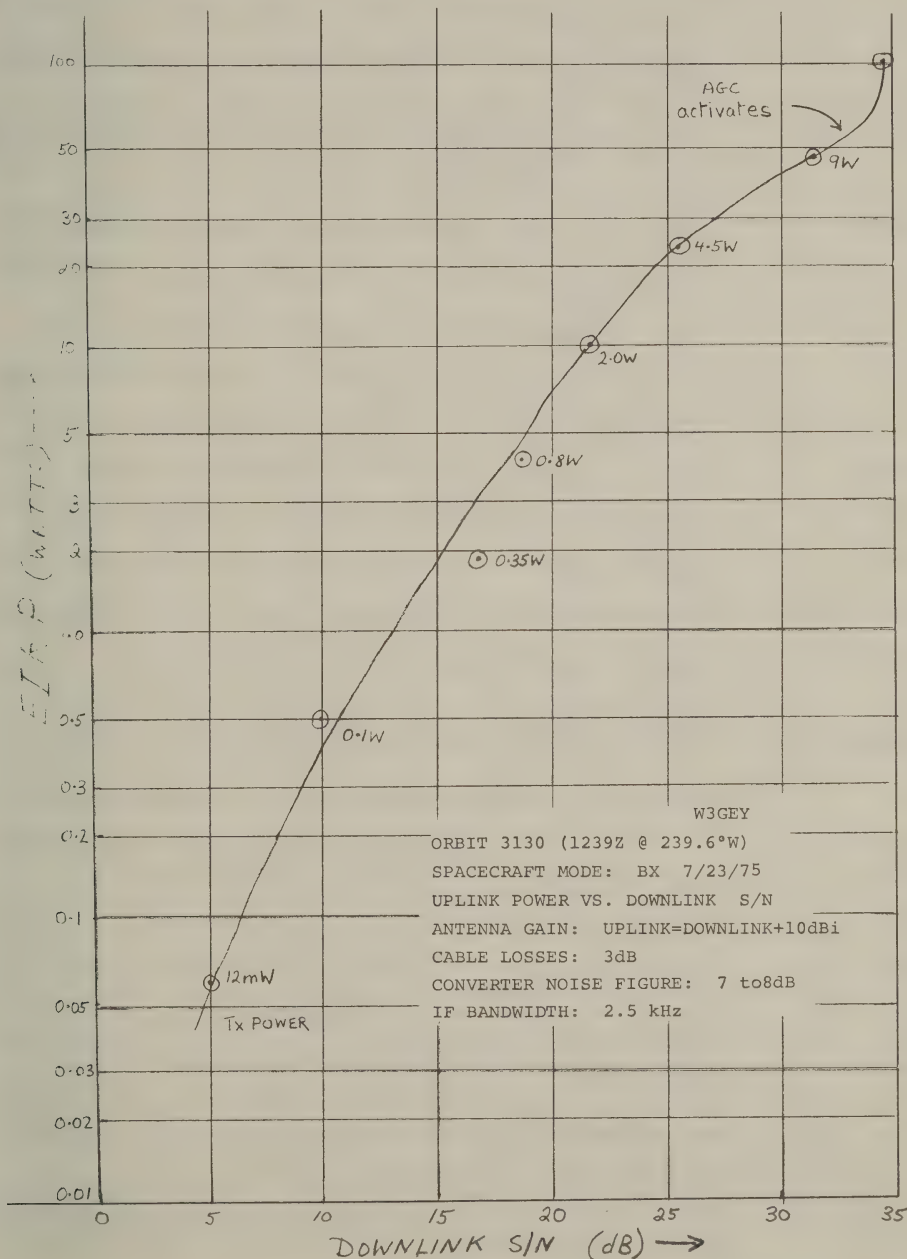
A Preliminary Design Review will be held in Washington at the end of April/ beginning of May, after which more details of the spacecraft will be available.

PHASE III SPACECRAFT SCHEDULE (tentative)
(Assumes March '78 Readiness Requirement)



AMSAT-OSCAR 7 MODE B ACCESS POWER EXPERIMENT

Recently Jan King, W3GEY, performed an experiment to determine just how much power was required to access the AMSAT-OSCAR 7 Mode B Transponder. The results are shown in the following graph. It can be seen that a usable signal was heard on the downlink with 12mW of transmitter output power. It can also be seen that raising the output power from 12 Watts to 100 watts has no effect on the strength of the downlink signal, because of the AGC action in the transponder. These results are for a single user in the passband. During normal operations, with multiple users, a little more output power will be required (but not much). In a multiple user situation the AGC action is a function of the combined signals in the pass-band with the stronger signals having the greatest effect.



AMSAT AREA COORDINATORS (USA)

For local help, information, and any other material relating to the AMSAT-OSCAR program, contact your local area representative listed below. Telephone numbers given are home phones.

Connecticut	Dennis Grindrod, WALEHF, 564 Stillman Street, Bridgeport, CT 06604
Rhode Island	George Simmons, WA1POJ, 46 Broad Street, Warren, RI 02885 (401) 245-4075.
New York	Bob Crumrine, WB2DNN, 24 Parkmere Road, Rochester, NY 14617 (716) 342-0479 Fred Merry, W2GN, 35 Highland Drive, East Greenbush, NY 12061 (518) 477-4990. Kaz Deskur, K2ZRO, P. O. Box 11, Endicott, NY 13760 (607) 748-8028.
New Jersey	Ed Bizub, WA2CBB, 1579 Franklin Street, Clark, NJ 07066
Pennsylvania	Glenn Kurzenkabe, K3SWZ, 403 Centerview Avenue, New Cumberland, PA 17070 (717) 938-3655. Steve Cruse, K3WHC, 1018 No. George St., York, PA 17404 (717) 848-1302.
Virginia	Ted Mathewson, W4FJ, 1525 Sunset Lane, Richmond, VA 23221 (703) 355-5118.
Florida	Walter Dixon, W4DWN, 820 N.E. 123rd Street, Miami, FL 33161 (305) 895-0398. Mark Calderazzo, WB4UOK, 6257 Luzon Drive, Orlando, FL 32809 (305) 855-2602. William McInnis, WA4WBG, P. O. Box 21073, Kennedy Space Center, FL 32815 (305) 632-1625 [home]
North Carolina	Jim Stewart, WA4MVI, Rt. 8, Box 92, Hendersonville, NC 28739 (704) 684-2090.
Georgia	William C. Latimer, WA4DDH, Box 994, Marietta, GA 30061 (404) 926-4053.
Mississippi	William Appleby, WB5DCY, 28 Linda Lane, Long Beach, MS 39560 (601) 863-6791.
Texas	Steve Hay, K5RZU, 11010 Strait Lane, Dallas, Texas 75229 (214) 361-1860.
California	Bud Schultz, W6CG, 3050 Ball Road, #154, Anaheim, CA 92804 (714) 826-4850.
Washington	John Barboe, K7VNU, Rt. 4, Box 1157, Sequim, WA 98382 (206) 683-4730.
Utah	David Middleton, W7ZC, Box 303, Springdale, UT 84767 (801) 772-3360.
Michigan	Richard Cotton, W8DX, 5526 Buckingham Road, Detroit, MI 48224 (313) 885-9310.
Ohio	Tom Eavenson, K5BWZ/8, 7261 Stonehurst Dr., Dayton, OH 45424 (513) 236-9623.
Illinois	Joe Schroeder, W9JUV, Box 406, Glenview, IL 60025 (312) 724-8816.
Indiana	"K.O." Learner, K9PVW, RR5, Box 370, Kokomo, IN 46901 (317) 453-2947.
Kansas	Jim McKim, W0CY, 1404 South 10th, Salina, KS 67401 (913) 827-2927.
Hawaii	Katashi Nose, KH6IJ, 4207 Huanui Street, Honolulu, HI 96816 (808) 734-1463.
Puerto Rico	Mike Fnciso, KP4DPN, 168 San Jorge, #11, Santurce, PR 00911 (809) 723-3554.
Nebraska	Doyle D. Kernes, WB0IUT, 7040 Seward St., Lincoln, NB 68507 (402) 464-6867.
Oklahoma	Bob McArthur, WB5MSU, Box 694, Grove, OK 74344 (918) 786-3235.
North Dakota	Rev. Doug Millar, WB0NST/K6JEY, Box 275, Rutland, ND 58067
New Hampshire	Don Brown, W1JSM, 638 Post Rd., Greenland, NH 03840 (603) 436-6745.
Vermont	Stephen Warley, K1LJL, 63 Moore Drive, Burlington, VT 05401 (802) 758-3679
Maine	Lad F. Hlavaty, W1CRL, 17 Shirley Rd., Needham, Needham Heights, MA 02194 (617) 444-4393.

If you do not live in the USA, you may obtain information about AMSAT from the following.

AMSAT AFFILIATE ORGANIZATIONS

<u>AMSAT-Mexico</u>	c/o D. Liberman, XE1TU, Bosque de Sayula No. 22, Mexico, I.O., D.F., Mexico.
<u>Japan AMSAT Assoc.</u>	c/o H. Yoneda, JALANG, 15-1305 Shimouma 2-Chome-26, Setagaya-ku, Tokyo 154, Japan.
<u>WIA-Project Australis</u>	c/o D. Hull, VK3ZDH, 3 Oliphant Court, Mulgrave, Victoria, 3170, Australia.
<u>AMSAT-Nederland</u>	c/o W. Dekker, PA0WLB, P. O. Box 87, Norwijk, 2460, The Netherlands.
<u>AMSAT-Deutschland</u>	c/o A. Schoening, DC7AS, Maxmiliankorso 52, 1 Berlin 28, West Germany.
<u>AMSAT-UK</u>	c/o P. Gowen, G3IOR, 17 Heath trescent, Hellesdon, Nrowich, NOR 58N, England.
<u>AMSAT-Italia</u>	c/o G. Giro, I3BMV, P. O. Box 372, 34100 Trieste, Italy.
<u>AMSAT-Canada</u>	c/o E. Welling, VE3HD, 165 Catalina Drive, Scarborough, Ontario M1E 1B3, Canada

OVERSEAS COUNTRY COORDINATORS

Costa Rica	Eric Roy, TI2NA, Box 661, San Jose, Costa Rica.
Peru	Paul Wyse, OA8V, Casilla 2492, Lima 100, Peru.
Brazil	Edmilson R. de O. PY7CPK, Caixa Postal 27, 58100 Campina Grande PB, Brazil.
India	V. Subramanian, VU2UV, 159/1 Silver Oak Avenue, Hq. Trg. Command IAF, Hebbal-Bangalore, 560006, India.
Switzerland	Ted Vogel, HB9OP, 186 Route de la Capite, 1222 La Capite, Geneva, Switzerland.
New Zealand	Bruce Rowlings, ZL1WB, Mason Street, Onerami, Whangarei, Northland, New Zealand.
France	Francon Gerard, F6BEG, 17 Rue du Chauffour, 15130 Arpajon-Sur-Cere, France.
Ivory Coast	Hugh Rylands, TU2EF, Douglas Aircraft Representative, AIR AFRIC-Direction-Technique, Boite Postale 21.017, Abidjan, Ivory Coast.
Seychelle Islands	Billy Lane, VQ9L, Box 191, Mahe, Seychelles.
Romania	Soli Iulius, YO2IS, c/o YO2 Radio Club, P. O. Box 100, 1900 Timisoara, Romania.
Poland	Adam Suchete, SP9DH, Box 73, 32-560 Kreszowice, Poland.
Ireland	Jim Malone, E14N, 136 Mount Prospect Avenue, Clontarf, Dublin 3, Ireland.
Greece	George Vernardakis, SV1AB, 3 Kristali St., Peristeri, Athens, Greece.
Phillipines	Dr. E. J. Garcia, DU6EG, 92 Lacson St., Bacolod City, Phillipines 60001.
South Africa	Gregory Roberts, ZS1BI, P. O. Box 9, Observatory, 7935, South Africa.
Venezuela	Edgar Mueller, YV5ZZ, Apartado 76093, Caracas, 107, Venezuela.

If you are an active satellite user and there is no AMSAT Coordinator or Affiliate organization in your state or country, why not volunteer for the task. Write G3ZCZ at AMSAT for details.

If there is one, why don't you contact him and form a group.



LETTERS AND COMMENTS"

Dear AMSAT

I was talking to Chuck, K6LFH, last night on 2M SSB and happened to mention a contact I had made through OSCAR's 6 and 7. He thought you might be interested.

On about August 5th while I was on vacation in Northern California I was listening to OSCAR 7 in my VW Bus when I noticed someone on UPPER sideband. I switched over to see what was up and found VE7BBG calling for OSCAR 6 users on 10M. Obviously, the two satellites were linked up. Since I had my KLM 10-140BL Amplifier, I decided to see if I could get through to him. I had about a 6-7 minute QSO after which another station (W2GN, I think) called me but apparently lost the satellite before I could respond. Later I also worked W9TFY from Patrick's Point State Park while taking a "rest stop." The BBG contact was while mobile in the 3000 foot mountains between Eureka and Mt. Shasta Area (Hwy 299).

I've not repeated this since it has not been convenient. I'm not sure whether the linkup has occurred since, but I think one is coming up. I'm going to give it another try at that time.

Doppler seemed to be no problem as I was transceive on BBG's frequency (downlink from 432) and he was monitoring his own signal on 10M which is approximately where I also came out.

Unfortunately, I have not been able to confirm with either gentleman as I have no address for either. (Try AMSAT QSL Bureau--ed.).



73,
Jim WB6JNN



Dear Joe,

To follow up the experience from Bud, W6CG, in the December 1975 Newsletter, here is the other side of the story of our SDX QSO.

In the very early days of A-0-6 some very long haul hearings occurred, e.g., G3COJ was heard by ZE7JX, VU2UV by G3IOR, G3IOR by many JAMSAT enthusiasts, not all of which could be explained by the equatorial ionized belts producing 'scatter' effects. Quite amazing early acquisitions have been made from Africa, like Hugh, TU2EF, copying Gordon, VE5XU, whilst Gary, CN8BO, often demonstrated that he could command OSCAR 6 when it was at slant ranges of some 3500 miles plus, well below his horizon.



During the Northern Hemisphere Summer, when the Polar area was in continuous daylight, I often received reports of my signals being heard when OSCAR was well below my horizon from VE5XU, KL7MF, a UAØ SWL, and once

worked Ed, W3UN, with a 339 report when OSCAR 7 was 3500 miles from me, and 2500 from Ed. Post-horizon timing tests with Rich, KH1TV, showed that he could copy me well up to six minutes after I had lost my own signal in the noise, although I could still copy his signal on the downlink. It became evident that the accepted line-of-sight theory was in practice more like the amateur VHF practice, e.g., "line-of-sight plus a bit." It was the BIT that was worth investigating! On the day before our QSO, HF propagation was quite good, considering the current solar limitations. My own downlink [to me] disappeared very abruptly at 65°W, 75°N, dead on my horizon at AOS time exactly. However, I could still copy the beacon, and, on tuning around, could still hear excellent signals from VE5XU, W4GCB, W5CSU, K3KTF and a whole lot more. I was still copying seven minutes later when up popped Bud at 569. I copied his entire QSO with Gordon, then his QSO with K3KTF, and I finally lost the downlink some eighteen minutes after I should have, when it was getting buried in domestic electrical noise, and at 115°W, 40°N, over the Arizona/California border. I called Bud blind, and hoped.

I had heard W6 before, but never with a 'lift' on VHF to help, and usually in an Aurora, when signals were soon buried in the high noise from the North. The following day, conditions were similar, with an extension on 'two' to boot. I just kept calling Bud with his report, long after my own signals were well in the noise, when up he came with a snappy call and report, dead on frequency. I grew a foot in one minute, as we had been trying it for many moons, knowing that sometimes Bud could copy me, and sometimes I could copy Bud, but rarely at the same point in time. Luckily, I had the tape recorder running, or I would never have believed our luck!!

To those anxious to exploit this possibility, may we offer the following advice: (1) don't worry if you cannot hear yourself...others closer to the downlink source may well be getting you. Your problem is to hear them, and a good receiving set-up is essential;



(2) if you can't hear yourself, then an accurately calibrated receiver and transmitter, and an allowance for increasing Doppler shift, is essential, especially as you may need to listen in a narrow filter slot to get the signal out of the noise. A side-tone too helps you to send legible CW when you cannot monitor your own signal;

(3) use "meteor scatter" techniques, e.g., fairly fast CW, with constant repetition of the calls and the report, then pause with a "BK" and repeat.

(4) study both HF and VHF propagation, and make full use of both solar index and barometric highs, and if they fortunately coincide, dig in fast!

Generally speaking, OSCAR itself is an excellent forecaster in its own right, and will tell you all that you need to know about conditions. HIGH MUF, e.g., good propagation up to ten meters can be detected by good signals, albeit fluttery, on the ten meter downlink long after your official LOS, or coming up long before.

Good Tropospheric conditions are evidenced by the extinction of your own uplink signal on your downlink monitoring with rapid 'pop-ups' as OSCAR gets low on your horizon, due to the scintillation ducting of the two meter uplink to OSCAR through the variable density refractive ducts. Sporadic 'E' is apparent when rapid and deep QSB on your constant signal occurs due to multiple diffraction paths at the higher atmospheric levels at the right times of the year.

Aurora manifest themselves by a marked lowering of an otherwise excellent tone of some of the more Northerly stations. This can be quite specific to small areas, and I have checked my smoothing capacitors more than once after hearing myself at "Tone A" on the downlink. Early warning of Aurorae are often given by sunspots gathering to blow off by High MUF evidence, and by marked flutter and roughness on all downlink signals as OSCAR approaches the auroral zone.

As for detecting UHF openings, just turn your 432 MHz antenna around when the DX stations are beaming over you, at low angle elevations, toward OSCAR 7 on Mode 'B', and you will be surprised what you can hear at times! [The same, of course, applies to 145 MHz on Mode 'A'.]

The gear at G3IOR is virtually all home-made, and generally raises a chuckle from visitors. The uplink consists of a 14-145 MHz transverter giving up to 15 w of CW, 20w pep SSB, which feeds either a crossed dipole on the shack roof for overhead and high angle orbits, or a switchable vertically or horizontally polarized 10

element long Yagi, with 360° azimuth and up to 90° elevation at 65' feet. The downlink is a 29.5 MHz peaked SB101, with a pair of MOSFET's ahead to give a further 25dB and even better signal/noise. This is fed with either a crossed dipole cut for 29.470MHz on the shack roof for the high passes, or a Moseley TA33 at 55' on the tower, just below the 10 el. Yagi. The greatest problems to "Oscaration" emanate from unsuppressed thermostats, dimmers, electrical appliances, and unscreened TV RX's in my suburban area, all and any of which are a real menace when one is straining ones ears at full gain for that weak one.

Pat Gowen, G3IOR

Gentlemen:

Last night I was going to operate on OSCAR 6 and 7. I found that it was useless to try. The problem was the obvious high power that many stations were using. My hope is that all users understand that they will, and are going to shorten the life of the satellites. This no one wants. My own station is an Echo 2 (10 watts) to two 9 el beams positioned vertically and pointed 35 Deg above the horizon. My receiver is a R4B with a preamp to a vertical.

Please fellows, if you can't hear your signal take a good hard look at your receiver then try decrease the ERP. You will be pleasantly surprised I am sure. You will also help everyone, including yourself.



73,
Bob, W4NUL/5

Dear Joe:

Outside of the (practically) 200 Japanese amateurs who have been active in amateur satellite communications work, we now have YB7AAU, Walt in Balikpapan, Kalimantan; VS6HI, Mal in Hong Kong; KG6JFT, Bill in Guam; DU6EG, Ed in Bacolo City, Philippines, and other regulars such as VU2RM in India; RAØLFI and RAØLFK, both somewhere in Siberia, heard and worked on AO-6 and Mode 'A' of AO-7. Both DU6EG and VS6HI are active on AO-7, Mode 'B' also, but the rest are not on 432-MHz as yet (except 'JA's' of course).

73
Haruo Yoneda, JALANG



All Mail Paid

(continued on page 28)

(continued from page 27)

Dear Joe,

Just another note for the newsletter:

The AMSAT OSCAR QSL Bureau in 1975 handled about 6,000 QSL cards for 312 U.S. & DX stations. About 10% are still in the deadpile. So the QSL Bureau saved about \$400 in postage for the OSCAR users in 1975. Now that the postage rates have gone up we have been averaging about 5 new stations per day (cheap skates, HI HI) So, I thought the members would be interested in how we're doing.



Best 73,
Dennis, WALEHF



Dear Joe,

So far we've only had ZS1BI, 5Z4JJ and ZD8LS, but hope to have soon 9J2AB (ex 4S7AB) and a few others with us. Dr. Peter from Kilimanjaro, 5Z4JJ is very regular both on the Net and OSCAR and we have many QSO's on both. ZS1BI is an Astronomer at the South African Observatory at Cape Town and is an AMSAT life member. ZD8LS, Pat and Larry are the guys who have promised all Orbital Data from NASA Computers on Ascension to any African Station who will pay the postage. They also volunteer to 'Control' OSCAR 6 if AMSAT permits them so to do. They have all equipment and would only need the 'switching information'.



EL2FE, Lee, has Heath HW-202 and has made his beam so will be on VERY soon. Chuck, 6W8FP, volunteers to come on OSCAR if he can get a 'Loaner' Tx from AMSAT. Both these guys should be 'easy-pickins' for the U.S. East Coast!

Have had many late-nite QSO's with WA7SIN/8R1, Gerry (ex 4W1GM fame) who is now getting a 'Loaner' TX-62 from KV4AD imminently ex AMSAT. So you'll be hearing him very soon, too.

73

Hugh, TU2EF

Gentlemen,

My initial mistake was to listen for OSCAR. Now it's all over as the bug has bit. At this point in time it's a new ball game for me and I have a lot to learn. Any help at all would be appreciated.

I would like to learn all I can and then determine if I will be able to actively participate in the AMSAT program. I suspect it's one of the best things to happen to amateur radio lately.

Thank you for your time and interest.

Dear Sirs,

I have several questions but don't really know where to address them. I hope you can route this letter to the correct party(s).

When I joined AMSAT at the Hartford Convention, I was told that there were endorsements to attach to the membership certificate for having worked through both OSCAR 6 and 7. As I have done this many times, I would be interested in finding out how to obtain these awards. I also would like to find out where to purchase the little red AMSAT stickers that members attach to their QSL cards.

I have more than 3 times the number of contacts necessary for the OSCAR award or the (and) ARRL 1000 award but at the rate I am receiving returns on my QSL cards it will be the year 2000 before I am able to apply!

I have been a little upset lately about the turning off of OSCAR 6 as soon as OSCAR 7 comes on in B mode. I stand the problem but only have capability to operate on alternate orbits while they are so close to each other and both on at the same time. One thing that should be in all newsletters in bold type -- KEEP YOUR RECEIVER IN SHAPE. I hear lots of alligator rigs on - all mouth and no ears . . . When people can't hear themselves, they figure they need more power.



I have written a program for the HP 25 Programmable Calculator that will run continuously giving the date, mode (for OSCAR 7), orbit #, Long of crossing and time in H.m.s. for each orbit. Using your data input for one reference orbit I have run off two months orbits without any deviation from your data. I will send out copies for a SASE to anyone interested.

Very truly yours,
Doug Randall, WB2ZTD

(see ads in newsletter - ed.)

73

Bruce Rattray, VE3FCH/W1
Dover, N. H.

Dear Perry:

In reading the December issue of the AMSAT Newsletter, I was delighted to note the continuing successful performance of "OSCAR 6 & 7." I have recently returned from Rome, Italy, where I had occasion to meet with representatives of Telespazio and Centro Nazionale Ricerche (CNR). During my discussions concerning the launch insurance requirements for their programs, I related to them my experience with your organization and one of the gentlemen present was familiar with AMSAT. This meeting was coincidental in view of the Newsletter article about AMSAT Italia's participation in the "Let's Save Venice" exhibition.



I wish you and your organization continued success in 1976.

Sincerely,
Dick Nausch

(Dick is the agent who insured the A-O-7 launch . . . ed.)



A FEW THOUGHTS ON QSL CARDS

The only thing more disturbing than not receiving a QSL card is receiving one filled out incorrectly. Regardless of what award you are working toward, incorrect or incomplete QSL cards are worthless!

QSL cards should be filled out carefully and double checked for accuracy. If you are active on several modes, be sure the mode is correctly indicated. A card indicating a 2-way CW QSO will be of no value to a RTTY operator.

Always use GMT (UTC) and spell out the date -- 9 Jan. 1976 -- not 1-9-76 or 9-1-76. Last but not least, don't forget the report and the band.

If you should make an error, don't write over or cross out -- fill out a new card. Questionable or apparently altered cards only create hard feelings when they are rejected by award managers.

QSL cards are becoming more and more costly to send, so let's all try to make each one count.

(and use the AMSAT Bureau -- ed.)

Glenn R. Kurzenknabe
K3SWZ



Dear Joe:

I have come up with an idea for what I think would be a regular column for the "AMSAT Newsletter." I would be willing to write this column if you're interested and provided I can get information from

the members using the satellites.

This column would be an activities column detailing what DX and hard-to-get states are on the satellites. Users could send this information to me including what pass the station was heard, what frequency and mode, and any other pertinent data. Addresses could also be provided for QSL'ing. DX stations could also send this information to me so stations would know where to look for them. Information on expeditions and loaner rigs sent to DX stations could also be listed. The purpose of the column would be to help users increase their state totals, country totals, and QSL response.

Please let me know your thoughts on my idea. I am interested in learning if you also think it's an acceptable idea for a column.

73,
Ed Bizub, WA2CBB
New Jersey Area Coordinator
1579 Franklin St.
Clark, NJ 07066

(Any such column is up to the readers. I will publish it if you get the inputs and present the column before the deadline dates. It's up to the readers . . . Joe)



Before the wedding night: "Sorry, Darling, but during passes 8405, 8406 and 8407 you'll have to read a book."

(from Radioamatérský Zpravodaj magazine from Czechoslovakia)

CLASSIFIED

These messages are published as a service to members at no cost on a space available basis. Deadline for the next issue is 12 May 1976

HA-2 and HA-6 with p/s, like new, w/all cables and manuals, \$300.00; you ship.
K10JQ (617)773-4421.

OSCAR 6-7 TRANSVERTER set-up for Henry Tempo One or YAESU FT-200. This is the 2mtr. transverter in the ARRL Handbook using 2-6360; 10 watts out 20 PEP W. Price \$40. You pay shipping. Enclosed in black cabinet the size of Tempo One. Provisions added for 6 mtr xvtr. WA4BZP, Tom French, 909 Society Ave., Alb, GA 31701

OSCAR QSL BUREAU USER'S LIST

1 JANUARY 1976

Stations with an asterisk (*) should send envelopes. If you work one, ask him to send in an envelope.

W1BIH	W2GZZ	W3GF	WA4DYL	K4ZCP*
W1CRL	WA2HGS*	WA3GOS*	W4ENQ*	WA4ZIA*
W1DGZ	W2HHG*	W3HMU	WB4EXW	W4ZXI*
W1DIQ*	W2HHJ	W3HUC	W4FJ	
W1DQJ	W2HI	W3HZU	W4FPS	K5BWZ
WA1EDX	W2HKM*	W3IOH	WA4GBE	K5CE*
W1FIS*	W2HKW*	K3JTE	K4GFG*	WB5DCY
W1FJH*	W2HXF	W3JPT	W4GFO*	WA5ETV*
W1FN*	W2IKO*	W3KMY	WB4GIB*	W5FCD
W1FRR	WB2ILV*	W3LB	K4GSX	W5GEL*
W1FTX	W2IOS*	K3LFO*	K4GTO*	W5HN
W1GBO*	WB2IXH*	W3LNA	WB4GZK	WB5IQG*
WA1GPO*	W2JB	WA3LND	K4HJE	WB5KIE*
K1GXU	K2JIQ*	WA3LOS	K4HRN*	WA5KPG*
WA1HFG*	WA2JSW*	WA3LZK*	W4HV*	K5KQG
K1HTV	K2KL*	WA3MSW*	WB4IFG*	WB5KXH*
WA1IGV	K2KNV*	K3MWV	K4ILC*	WB5LBT
K1IKN*	W2LFL*	WA3NAN	WA4IPI*	K5LLL
W1JAA	K2LGI	W3NKR	W4ISS	K5LZO
W1JSM	WA2LOF*	WA3NSR	WA4JID	WA5MHR*
WA1JYP	W2LV	W3OMY*	K4JYM*	WB5MPU
WA1JZC*	WB2MDR*	W3PHG*	WB4KGV	W5MSR*
W1KK*	WA2MPC	W3PZK*	WB4KMY*	W5ORH*
W1KZU	W2MPP*	W3QBC	K4KQ	K5PKV*
K1LJL*	K2MQY	W3RFN*	K4KZG*	W5QQQ*
W1MM*	W2NSD*	K3RXK	WA4LBO	WA5RBH*
W1NU	K2OMS	WA3SOR*	WB4LEQ*	W5RUB
WA1POJ	K2ORT*	WA3SOX	WB4LHD*	K5RZU
W1PVE*	K2OVS	K3SUI	W4LSQ*	W5SLL
K1PXE	K2PXX*	K3SWZ	WA4LXV*	K5STL*
WA1RFT	K2QBW	W3TFA	WA4MMP	W5SXD*
K1SAK	K2QHZ*	WA3THD	W4MOP	W5UB
WA1SCV	W2QLI	W3TMZ	K4MSG*	W5UCY
K1SDC*	WA2QOI*	K3TNM	WB4MVD*	W5VAE*
W1SG*	WA2RNZ	K3UDO*	WA4MVI	W5VY
WA1SHU	WA2RQC*	W3UN	WA4NKC*	WA5YHN*
WA1SMG	WB2RQM	WA3UNJ*	W4NUL	K5YZO
WA1SQB	WB2RTF	WA3VRH*	W4NUS*	K5YZQ
K1STO*	K2RTH*	K3WHZ	W4NVU*	W5ZSX
WA1SUI*	W2SBI	WA3WID	W4NW	
WA1USZ*	WB2SKA	W3WJC	WB4PAG*	W6AB
WA1VTA*	W2SOQ	K3WSZ*	K4PCL*	W6ABN
W1WK	WA2TOI	K3YHR	W4RJC*	W6APW
W1WM	WB2TNC	WA3ZCE	WB4RUA	W6ASA*
W1WTE*	K2TTI*		K4SAN*	K6BAZ*
W1WX	K2UBC	WB4AHH*	K4SR	W6BGJ*
K1ZQL*	K2UCT*	W4AIT	WA4SUY*	W6CG
	WA2UKS	K4AM*	K4TI	W6CU
W2AQT	K2UYH	W4AMI*	WB4TKI*	WB6CUY*
WA2BIT*	WB2VKZ	W4ART	W4TMQ*	W6DL*
W2BLV	WB2WZX	WA4AUY*	K4TT*	W6DQY
W2BXA*	W2YY*	WA4BCX	WB4TTL*	W6DOW
K2BZT	K2ZRO*	W4BM*	W4TYE*	W6ELT
WA2CBB		W4BPT*	WB4UOK	W6ETJ
W2CCB*		K4BPY*	WB4UOX*	W6FBY*
WB2DEI	K3AKR	WB4BUL	K4UZV*	WA6GGK*
WB2DNN	W3AS*	WB4BWK	W4VBX*	K6GSS*
W2DU*	W3BHG	K4CAW	WB4VOX*	K6KZ*
W2EPZ	W3BWU	K4CFB*	K4VT*	W6GSS*
W2EUO	K3CFY	K4CYF	K4VW*	
WA2EVN*	W3CPU	K4CYR	K4WKH*	W6ISQ
WB2EXL	W3CWC	WB4DAA*	W4WNH	WF6ITU*
W2FBF	WA3DJG*	WA4DDH*	W4WSF	W6IZK*
WB2FCP	WA3DMF	W4DFK*	K4WT	WA6JFP
W2GEV*	WA3EPT	W4DO	WB4YFC	WA6JUD*
W2GF	WA3ETR*	WA4DPN*	K4YYJ*	W6KAG*
W2GN	K3FFR	K4DSD*		WB6KAP*
K2GQI*	W3FVY	W4DWN	W4ZCB*	WB6KBI*
W2GV	W3GEY			
W2GVW				

AMSAT-OSCAR QSL BUREAU

Dennis Grindrod, WA1EHF, 564 Stillman Street, Bridgeport, Conn. 06608 is serving as AMSAT QSL Manager for OSCAR cards in the United States. U.S. users should send several #10 (business-size) SASE's, which will be filled with incoming QSL cards and mailed when full. Outgoing DX OSCAR QSL's will be forwarded at a rate of 6¢ per card or 20 cards for \$1.00. Domestic QSL's (U.S., Canada and Mexico) can be sent in bulk. These will be sorted and placed in the SASE's.

K6KDE*	K7COC*	WB8LGA*	WB9IFG	WØKDY*
WA6KKP*	W7CTX	K8LIO*	K9IMM*	KØKFC*
K6KLY*	WA7FDO*	W8LRE*	W9IV*	KØKU*
W6KMV	W7GBI	WB8LWU*	WB9IWO*	WØLCN
WB6KVC	WA7GCS*	WA8MUV*	WB9JSR*	WØLER*
WB6KYW*	K7GWE	WA8MXB*	K9JUJ	WØLG*
W6LFJ*	WA7GXJ	K8MYN	W9JUJ	WØMSC*
K6LOM*	W7HZJ*	W8NFW*	W9JZK*	WAØNLK*
K6LOW*	K7ICW*	K8NIW*	W9KDR*	WAØNLU*
WB6MKY*	W7JDZ*	WA8NTT*	W9KJU	WBØNST
WB6MNT*	W7JKD*	WB8OFR	K9LCR	WØONM*
W6MSG*	W7KJK	W8ON*	WB9LKY	WBØOPV*
WA6MWG*	W7LFX	WA8OUH*	WA9LRO*	WØQOI*
K6MYC*	W7MCR*	W8OY	W9MAL*	WØOVV
W6NBI*	W7MKW	WA8PJJ*	W9MLF*	WØPAY
W6NTY	K7NEQ	WB8QZJ	WB9MRP*	WØPHD
W6NZX*	K7NKF*	WB8RNW*	W9NLS*	WØPKH*
W6OAL*	K7OFT*	WB8RTY*	W9OAC*	WBØPND*
W6OCP*	K7RZU*	K8RYU*	W9OII	WØQIN
W6OV*	W7SFA	K8SCH	WA9OZN*	WAØQLP*
WB6OVH	WA7SHP	W8SGV*	WB9PMY*	WBØQMV*
K6POY*	WA7SJV*	K8SMC	WA9PVV	WØRWC
WA6PTX*	WA7TZY	WA8TLZ*	W9QQG	WAØSAR
W6PVF	W7VEW	K8TQK*	W9REC*	WAØTAQ*
WB6PZW	W7VFT*	W8UM	K9REE*	WAØTMA*
K6RB	K7VNU*	W8VKR*	WB9REU*	WØWMP
WB6RIV*	K7WJF	WA8VPD*	K9RSF	WØYU*
WA6RQP	K7WTE*	WA8WDZ	W9TFY	WØYZS*
W6RQZ	W7ZC	W8WE*	W9TGB*	WØZWW
W6SVD	K7ZIR*	K8WEF*	W9TMY*	
WB6TEH*	K7ZOK	WA8WOQ*	K9UVJ*	KV4AD
W6TEZ*	W7ZRQ	K8WOT*	WA9VYX*	KH6BZF
W6TPJ*	WA7ZWO	WA8YUZ*	WB9WRF*	KL7JDO
WA6TUF			W9ZJC*	KL7MF
WA6UFQ*	W8ANN*	W9AAG		
K6UI*	WB8BGY*	W9AFW*	KØALL*	
W6UIT*	WB8BJF*	W9ALU*	WBØCQJ*	
W6VOD	W8BT	K9BCT	WBØCUT*	DJ6RD
W6VOK*	K8CAY*	W9BZU*	WØCY*	G3ZCZ
WA6VRC*	W8CCI*	WA9CUH*	WBØDGF	VK3ZAI
W6VX*	W8DX*	K9DKW*	WBØEIC	
WA6WDR*	WA8DXB	K9DTB	WØEOZ	TI2NA
K6WE*	W8EDU*	WB9DZJ*	WBØFGV*	VE3BNO
W6WTX	K8GMR*	K9EIV	WØFLY*	VE3DTW
W6WYQ	W8HRQ*	W9ERC	WØGNS*	VE3EVW
W6YDF*	W8HWB*	K9EUZ*	WØII	VE3FJQ
W6YRA*	K8IRC	WA9FEF*	WBØIKJ*	VE3LF
W6YVO	WB8JHB*	W9FST*	WØIT	VE3TP
	WB8KAY*	K9HDE*	WBØIUT*	VE3TW
WA7BBM*	WA8KEM*	WA9HUV	WAØIYY*	VE3VYG*
W7BEC*	WDX8KHV	W9HVP	WØJVA*	VE5XU
WB7BST*	K8KWZ*	W9IFA	WØJYJ*	VE6SW

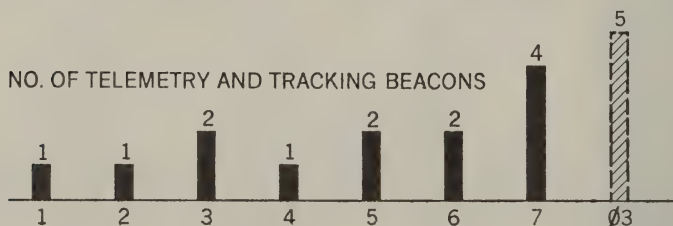
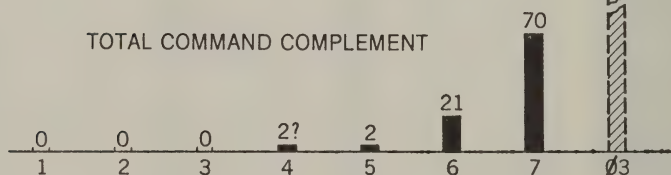
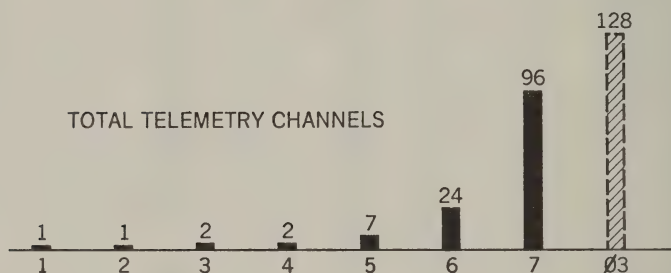
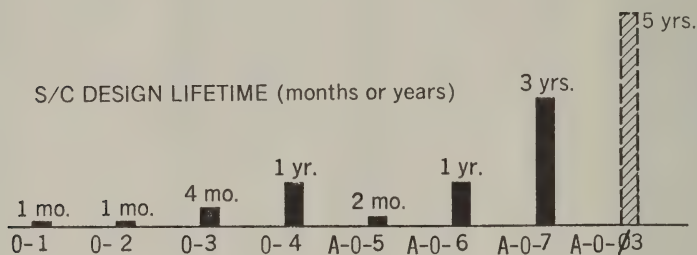
MEMBERSHIP RENEWALS

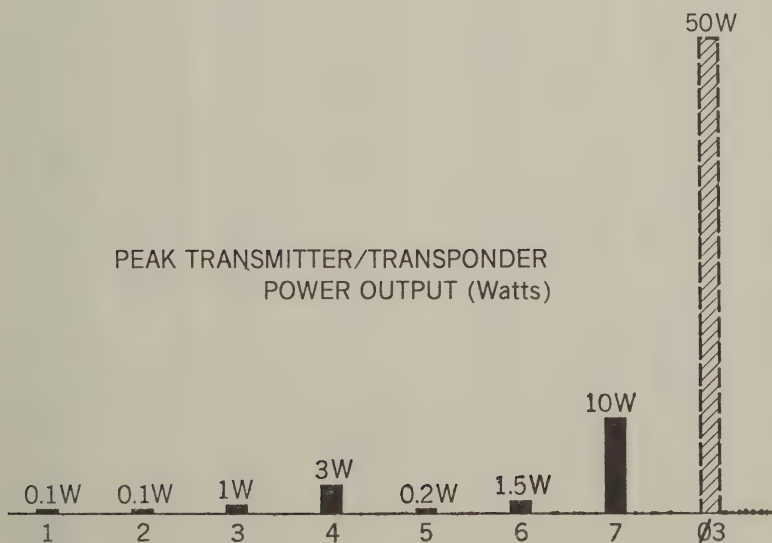
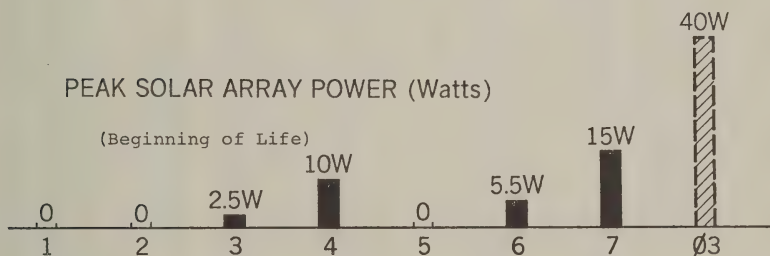
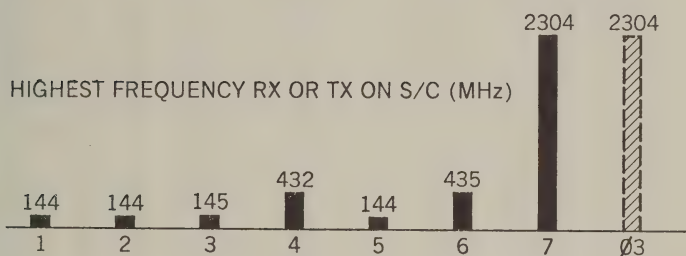
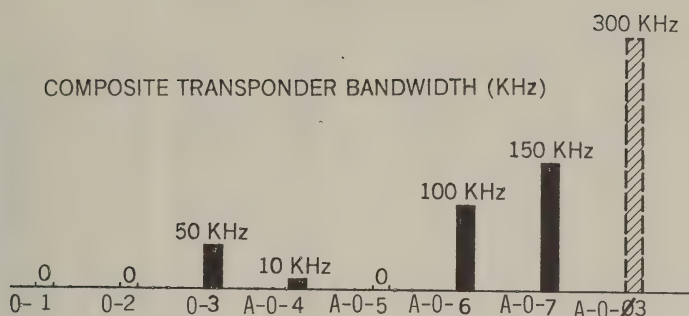
There are still a number of AMSAT members who have not renewed their membership., i.e., membership expired Dec. 31, 1975. If in doubt, check your mailing address label; at the upper left-hand corner is your membership expiration date. All former AMSAT members who have not renewed will be dropped from the rolls after mailing this newsletter.

OSCAR SATELLITE STATISTICS

These statistics were compiled by Jan King, W3GEY, and compare the first six OSCAR series and the Phase III spacecraft with one another. It can be seen that the spacecraft grew in complexity as the state of the art advanced.

An interesting factor is the "plateau" that shows up during the phaseover from Project OSCAR to AMSAT between OSCAR 4, Australis-OSCAR 5, and AMSAT-OSCAR 6.





AMSAT-OSCAR REFERENCE ORBITS

REF

G3202

AMSAT-OSCAR 6

AMSAT-OSCAR 7

ORBIT	DATE	TIME(2)	LONG W	ORBIT	DATE	TIME(2)	LONG W
15682	21 MAR	0013.90	56.40	6156A	21 MAR	0141.48	75.18
15685	22 MAR	0108.83	70.13	6168B	22 MAR	0040.81	60.01
15687	23 MAR	0008.76	55.12	6181A	23 MAR	0135.10	73.59
15690	24 MAR	0102.69	68.85	6192X	24 MAR	0034.43	58.42
15692	25 MAR	0005.62	53.82	6206A	25 MAR	0128.72	71.99
15695	26 MAR	0058.55	67.57	6218B	26 MAR	0028.06	56.83
15698	27 MAR	0151.48	81.10	6231A	27 MAR	0122.34	70.40
15700	28 MAR	0051.41	66.38	6243B	28 MAR	0021.68	55.23
15707	29 MAR	0143.34	80.02	6256A	29 MAR	0115.96	68.80
15709	30 MAR	0043.27	65.06	6268B	30 MAR	0015.30	53.64
15709	31 MAR	0143.20	78.72	6281X	31 MAR	0109.58	67.21
15730	1 APR	0043.14	62.72	6293B	1 APR	0008.92	52.04
15731	2 APR	0128.06	77.45	6305A	2 APR	0103.20	65.61
15735	3 APR	0048.00	62.42	6318B	3 APR	0002.54	50.45
15759	4 APR	0137.93	76.16	6331A	4 APR	0056.82	64.02
15760	5 APR	0012.56	61.15	6344B	5 APR	0151.10	77.59
15761	6 APR	0127.79	74.88	6356A	6 APR	0050.44	62.42
15765	7 APR	0027.72	59.86	6369X	7 APR	0144.73	75.99
15769	8 APR	0122.65	71.60	6381A	8 APR	0044.06	60.83
15769	9 APR	0011.58	58.58	6394B	9 APR	0138.35	74.40
15771	10 APR	0017.51	72.31	6406A	10 APR	0037.68	59.23
15775	11 APR	0037.14	57.10	6419B	11 APR	0131.97	72.80
15778	12 APR	0112.17	71.91	6431A	12 APR	0031.31	57.64
15780	13 APR	0012.21	58.01	6444B	13 APR	0125.59	71.21
15781	14 APR	0103.71	64.75	6456X	14 APR	0024.93	56.04
15785	15 APR	0001.11	54.71	6469B	15 APR	0119.21	69.61
15789	16 APR	0101.10	68.46	6481A	16 APR	0018.55	54.45
15790	17 APR	0001.01	51.45	6494B	17 APR	0112.83	68.02
15791	18 APR	0028.45	61.18	6506A	18 APR	0012.17	52.85
15793	19 APR	0131.80	80.31	6519B	19 APR	0106.45	66.42
15795	20 APR	0001.52	65.94	6531A	20 APR	0005.79	51.26
15797	21 APR	0148.73	79.61	6544X	21 APR	0100.07	64.83
15799	22 APR	0001.53	64.61	6556A	22 APR	0154.35	78.40
15800	23 APR	0144.61	78.14	6569B	23 APR	0053.69	63.23
15802	24 APR	0013.97	60.11	6582A	24 APR	0147.97	76.80
15821	25 APR	0148.04	77.06	6594B	25 APR	0047.31	61.64
15833	26 APR	0001.40	63.04	6607A	26 APR	0141.60	75.21
15835	27 APR	0131.15	75.78	6619B	27 APR	0040.93	60.04
15838	28 APR	0021.26	60.75	6632X	28 APR	0135.22	73.62
15840	29 APR	0011.14	57.44	6644B	29 APR	0034.55	58.45
15841	30 APR	0001.11	58.48	6657A	30 APR	0128.84	72.02
15846	1 MAY	0142.05	73.31	6669B	1 MAY	0028.18	56.86
15849	2 MAY	0001.29	58.12	6682A	2 MAY	0122.46	70.42
15851	3 MAY	0145.42	74.92	6694B	3 MAY	0021.80	55.26
15852	4 MAY	0005.38	58.91	6707A	4 MAY	0116.08	68.83
15856	5 MAY	0129.72	70.64	6719B	5 MAY	0015.42	53.67
15857	6 MAY	0001.31	58.62	6732A	6 MAY	0109.70	67.24
15860	7 MAY	0001.61	63.16	6744B	7 MAY	0009.04	52.07
15861	8 MAY	0005.51	54.14	6757A	8 MAY	0103.32	65.64
15863	9 MAY	0101.80	67.07	6769B	9 MAY	0002.66	50.48
15869	10 MAY	0001.41	51.06	6782A	10 MAY	0056.94	64.05
15871	11 MAY	0001.33	64.79	6795B	11 MAY	0151.22	77.62
15873	12 MAY	0150.14	80.52	6807X	12 MAY	0050.56	62.45
15875	13 MAY	0030.12	65.31	6820B	13 MAY	0144.85	76.02
15879	14 MAY	0143.15	73.21	6832A	14 MAY	0044.13	60.86
15881	15 MAY	0043.02	64.12	6845B	15 MAY	0138.47	74.43
15882	16 MAY	0040.01	77.45	6857A	16 MAY	0037.80	59.26
15883	17 MAY	0011.45	62.94	6870B	17 MAY	0132.09	72.83
15885	18 MAY	0141.42	76.67	6882A	18 MAY	0031.43	57.67
15887	19 MAY	0011.31	61.66	6895X	19 MAY	0125.71	71.24
15888	20 MAY	0142.14	73.27	6907A	20 MAY	0025.05	56.07
15890	21 MAY	0042.01	69.17	6920B	21 MAY	0119.32	69.64
15892	22 MAY	0042.00	74.10	6932A	22 MAY	0018.67	54.48
15893	23 MAY	0041.98	78.08	6945B	23 MAY	0112.95	68.05
15894	24 MAY	0041.86	71.67	6957A	24 MAY	0012.29	52.88
15895	25 MAY	0041.85	51.80	6969B	25 MAY	0106.57	66.45
15896	26 MAY	0141.20	71.84	6982X	26 MAY	0005.91	51.29
15897	27 MAY	0001.25	56.87	6995B	27 MAY	0100.19	64.86
15898	28 MAY	0001.23	54.25	7007A	28 MAY	0154.47	78.42
15899	29 MAY	0001.21	52.74	7020B	29 MAY	0053.81	63.26
15900	30 MAY	0101.04	68.47	7032A	30 MAY	0148.10	76.82
15901	31 MAY	0002.98	61.44	7045B	31 MAY	0047.43	61.67

REF

63202

AMSAT-OSCAR 6				AMSAT-OSCAR 7			
ORBIT	DATE	TIME(2)	LONG W	ORBIT	DATE	TIME(2)	LONG W
16584	1 JUN	0058.90	67.69	7058A	1 JUN	0141.72	75.24
16597	2 JUN	0152.82	81.42	7070X	2 JUN	0041.05	60.07
16609	3 JUN	0052.77	66.40	7083A	2 JUN	0135.34	73.65
16622	4 JUN	0148.69	80.13	7095B	4 JUN	0024.67	58.48
16634	5 JUN	0048.62	65.12	7108A	5 JUN	0128.96	72.05
16647	6 JUN	0143.56	78.85	7120B	6 JUN	0028.30	56.88
16659	7 JUN	0043.49	63.82	7133A	7 JUN	0122.58	70.46
16672	8 JUN	0138.42	77.57	7145B	8 JUN	0021.92	55.29
16684	9 JUN	0038.35	62.55	7158X	9 JUN	0116.20	68.86
16697	10 JUN	0123.28	76.28	7170B	10 JUN	0015.54	53.70
16709	11 JUN	0032.21	61.27	7183A	11 JUN	0109.82	67.27
16722	12 JUN	0128.14	75.00	7195B	12 JUN	0009.16	52.10
16734	13 JUN	0028.07	59.98	7208A	13 JUN	0102.44	65.67
16747	14 JUN	0123.00	73.72	7220B	14 JUN	0002.78	50.51
16759	15 JUN	0022.94	58.70	7233A	15 JUN	0057.06	64.08
16772	16 JUN	0117.86	72.42	7246X	16 JUN	0151.34	77.65
16784	17 JUN	0017.80	57.42	7258A	17 JUN	0050.68	62.48
16797	18 JUN	0112.72	71.15	7271B	18 JUN	0144.97	76.05
16809	19 JUN	0012.66	56.13	7283A	19 JUN	0044.30	60.89
16822	20 JUN	0107.59	69.86	7296B	20 JUN	0138.59	74.46
16834	21 JUN	0007.52	54.85	7308A	21 JUN	0037.92	59.29
16847	22 JUN	0102.45	68.58	7321B	22 JUN	0132.21	72.86
16859	23 JUN	0002.38	53.56	7333X	23 JUN	0031.55	57.70
16872	24 JUN	0057.31	67.30	7346B	24 JUN	0125.83	71.27
16885	25 JUN	0152.24	81.02	7358A	25 JUN	0025.17	56.10
16897	26 JUN	0052.17	66.01	7371B	26 JUN	0119.45	69.67
16910	27 JUN	0147.10	79.75	7383A	27 JUN	0018.79	54.51
16922	28 JUN	0047.03	64.73	7396B	28 JUN	0113.07	68.08
16935	29 JUN	0141.96	78.46	7408A	29 JUN	0012.41	52.91
16947	30 JUN	0041.89	62.45	7421X	30 JUN	0106.69	66.48
16960	1 JUL	0136.82	77.18	7433A	1 JUL	0006.03	51.32
16972	2 JUL	0036.76	62.16	7446B	2 JUL	0100.31	64.89
16985	3 JUL	0131.68	75.89	7459A	3 JUL	0154.59	78.46
16997	4 JUL	0031.62	60.88	7471B	4 JUL	0053.93	63.29
17010	5 JUL	0126.54	74.61	7484A	5 JUL	0148.22	76.86
17022	6 JUL	0026.48	59.59	7496B	6 JUL	0047.55	61.70
17035	7 JUL	0121.41	73.32	7509X	7 JUL	0141.84	75.27
17047	8 JUL	0021.34	58.31	7521B	8 JUL	0041.17	60.10
17060	9 JUL	0116.27	72.04	7534A	9 JUL	0135.46	73.67
17072	10 JUL	0016.20	57.02	7546B	10 JUL	0034.79	58.51
17085	11 JUL	0111.13	70.76	7559A	11 JUL	0129.08	72.08
17097	12 JUL	0011.06	55.74	7571B	12 JUL	0028.42	56.91
17110	13 JUL	0105.99	69.48	7584A	13 JUL	0122.70	70.49
17122	14 JUL	0005.92	54.46	7596X	14 JUL	0022.04	55.32
17135	15 JUL	0100.85	68.19	7609A	15 JUL	0116.32	68.89
17147	16 JUL	0000.79	53.18	7621B	16 JUL	0015.66	53.73
17160	17 JUL	0055.71	66.91	7634A	17 JUL	0109.94	67.30
17173	18 JUL	0150.64	80.64	7646B	18 JUL	0009.28	52.13
17185	19 JUL	0050.58	65.63	7659A	19 JUL	0103.56	65.70
17198	20 JUL	0145.50	79.36	7671B	20 JUL	0002.90	50.54
17210	21 JUL	0045.44	64.34	7684X	21 JUL	0057.18	64.11
17223	22 JUL	0140.37	78.07	7697B	22 JUL	0151.46	77.68
17235	23 JUL	0040.30	63.06	7709A	23 JUL	0050.80	62.51
17248	24 JUL	0135.23	76.79	7722B	24 JUL	0145.09	76.08
17260	25 JUL	0035.16	61.77	7734A	25 JUL	0044.42	60.92
17273	26 JUL	0130.09	75.51	7747B	26 JUL	0138.71	74.49
17285	27 JUL	0030.02	60.49	7759A	27 JUL	0038.04	59.32
17298	28 JUL	0124.95	74.22	7772X	28 JUL	0132.33	72.89
17310	29 JUL	0024.88	59.21	7784A	29 JUL	0031.67	57.73
17323	30 JUL	0119.81	72.94	7797B	30 JUL	0125.95	71.30
17335	31 JUL	0019.74	57.92	7809A	31 JUL	0025.29	56.13
17348	1 AUG	0114.67	71.66	7822B	1 AUG	0119.57	69.70
17360	2 AUG	0014.61	56.64	7834A	2 AUG	0018.91	54.54
17373	3 AUG	0109.53	70.37	7847B	3 AUG	0113.19	68.11
17385	4 AUG	0009.47	55.36	7859X	4 AUG	0012.53	52.94
17398	5 AUG	0104.40	69.09	7872B	5 AUG	0106.81	66.51
17410	6 AUG	0004.32	54.07	7884A	6 AUG	0006.15	51.35
17423	7 AUG	0059.26	67.80	7897B	7 AUG	0100.43	64.92
17436	8 AUG	0154.19	81.54	7910A	8 AUG	0154.71	78.49
17448	9 AUG	0054.12	66.52	7922B	9 AUG	0054.05	63.32
17461	10 AUG	0149.05	80.25	7935A	10 AUG	0148.34	76.89
17473	11 AUG	0048.98	65.24	7947X	11 AUG	0047.67	61.73
17486	12 AUG	0143.91	78.97	7960A	12 AUG	0141.96	75.30
17498	13 AUG	0043.84	63.95	7972B	13 AUG	0041.29	60.12
17511	14 AUG	0138.77	77.69	7985A	14 AUG	0135.58	72.70

REF

G32CZ

AMSAT-OSCAR 6				AMSAT-OSCAR 7			
OPBIT	DATE	TIME(2)	LONG W	ORBIT	DATE	TIME(2)	LONG W
18462	29 OCT	0018.50	57.65	8937A	29 OCT	0123.06	70.57
18475	30 OCT	0113.43	71.39	8949B	30 OCT	0022.40	55.41
18487	31 OCT	0013.36	56.37	8962A	31 OCT	0116.68	68.98
18500	1 NOV	0108.29	70.10	8974B	1 NOV	0016.02	53.81
18512	2 NOV	0008.23	55.09	8987A	2 NOV	0110.30	67.39
18525	3 NOV	0103.15	68.82	8999X	3 NOV	0009.64	52.22
18537	4 NOV	0003.09	53.80	9012A	4 NOV	0103.92	65.79
18550	5 NOV	0058.01	67.54	9024B	5 NOV	0003.26	50.62
18563	6 NOV	0152.94	81.27	9037A	6 NOV	0057.54	64.20
18575	7 NOV	0052.88	66.25	9050B	7 NOV	0151.83	77.77
18588	8 NOV	0147.80	79.98	9062A	8 NOV	0051.16	62.60
18600	9 NOV	0047.74	64.97	9075B	9 NOV	0145.45	76.17
18613	10 NOV	0142.67	78.70	9087X	10 NOV	0044.78	61.01
18625	11 NOV	0042.60	63.68	9100B	11 NOV	0139.07	74.58
18638	12 NOV	0137.53	77.42	9112A	12 NOV	0038.40	59.41
18650	13 NOV	0037.46	62.40	9125B	13 NOV	0132.69	72.98
18663	14 NOV	0132.39	76.13	9137A	14 NOV	0032.03	57.82
18675	15 NOV	0032.32	61.12	9150B	15 NOV	0126.31	71.39
18688	16 NOV	0127.25	74.85	9162A	16 NOV	0025.65	56.22
18700	17 NOV	0027.18	59.83	9175X	17 NOV	0119.93	69.79
18713	18 NOV	0122.11	73.57	9187A	18 NOV	0019.27	54.63
18725	19 NOV	0022.05	58.55	9200B	19 NOV	0113.55	68.20
18738	20 NOV	0118.97	72.28	9212A	20 NOV	0012.89	53.03
18750	21 NOV	0016.91	57.27	9225B	21 NOV	0107.17	66.60
18763	22 NOV	0111.84	71.00	9237A	22 NOV	0006.51	51.44
18775	23 NOV	0011.77	55.98	9250B	23 NOV	0100.79	65.01
18798	24 NOV	0106.70	69.71	9262X	24 NOV	0000.13	49.84
18800	25 NOV	0006.63	54.70	9275B	25 NOV	0054.41	63.41
18813	26 NOV	0101.56	68.43	9288A	26 NOV	0148.70	76.98
18825	27 NOV	0001.49	53.41	9300B	27 NOV	0048.03	61.82
18838	28 NOV	0056.42	67.15	9313A	28 NOV	0142.32	75.39
18851	29 NOV	0151.35	80.88	9325B	29 NOV	0041.65	60.22
18863	30 NOV	0051.28	65.86	9338A	30 NOV	0135.94	73.79
18876	1 DEC	0146.21	79.60	9350X	1 DEC	0035.28	58.63
18888	2 DEC	0046.14	64.58	9363A	2 DEC	0129.56	72.20
18901	3 DEC	0141.07	78.31	9375B	3 DEC	0028.90	57.03
18913	4 DEC	0041.00	63.30	9388A	4 DEC	0123.18	70.60
18926	5 DEC	0135.92	77.02	9400B	5 DEC	0022.52	55.44
18938	6 DEC	0035.87	62.01	9413A	6 DEC	0116.80	69.01
18951	7 DEC	0130.79	75.74	9425B	7 DEC	0016.14	53.84
18963	8 DEC	0030.72	60.73	9438X	8 DEC	0110.42	67.41
18976	9 DEC	0125.66	74.46	9450B	9 DEC	0009.76	52.25
18988	10 DEC	0025.59	59.44	9463A	10 DEC	0104.04	65.82
19001	11 DEC	0120.52	73.18	9475B	11 DEC	0003.38	50.65
19013	12 DEC	0020.45	58.16	9488A	12 DEC	0057.66	64.23
19026	13 DEC	0115.38	71.89	9501B	13 DEC	0151.95	77.80
19038	14 DEC	0015.31	56.88	9513A	14 DEC	0051.28	62.63
19051	15 DEC	0110.24	70.61	9526X	15 DEC	0145.57	76.20
19063	16 DEC	0010.17	55.59	9538A	16 DEC	0044.90	61.04
19076	17 DEC	0105.10	69.23	9551B	17 DEC	0139.19	74.61
19088	18 DEC	0005.03	54.31	9563A	18 DEC	0038.53	59.44
19101	19 DEC	0059.96	68.04	9575B	19 DEC	0132.81	73.01
19114	20 DEC	0154.89	81.77	9588A	20 DEC	0032.15	57.85
19126	21 DEC	0054.82	66.76	9601B	21 DEC	0126.43	71.42
19139	22 DEC	0149.75	80.49	9613X	22 DEC	0025.77	56.25
19151	23 DEC	0049.69	65.48	9626B	23 DEC	0120.05	69.82
19164	24 DEC	0144.61	79.21	9638A	24 DEC	0019.39	54.66
19176	25 DEC	0044.55	64.19	9651B	25 DEC	0113.67	68.23
19189	26 DEC	0139.48	77.92	9663A	26 DEC	0013.01	53.06
19201	27 DEC	0039.41	62.91	9675B	27 DEC	0107.29	66.63
19214	28 DEC	0134.34	76.64	9688A	28 DEC	0006.63	51.47
19226	29 DEC	0034.27	61.62	9701X	29 DEC	0100.91	65.04
19239	30 DEC	0139.20	75.36	9713A	30 DEC	0000.25	49.87
19251	1 JAN	0029.13	60.34	9726A	1 JAN	0054.53	63.44
19264	2 JAN	0124.06	74.07	9739B	2 JAN	0148.82	77.01
19276	3 JAN	0023.99	59.06	9751A	3 JAN	0048.15	61.85
19289	4 JAN	0118.92	72.79	9764B	4 JAN	0142.44	75.42
19301	5 JAN	0018.86	57.77	9776A	5 JAN	0041.77	60.25
19314	6 JAN	0113.79	71.51	9789X	6 JAN	0136.06	73.82
19326	7 JAN	0013.72	56.49	9801A	7 JAN	0035.40	58.66
19339	8 JAN	0108.64	70.22	9814B	8 JAN	0129.68	72.23
19351	9 JAN	0008.58	55.21	9826A	9 JAN	0029.02	57.06
19364	10 JAN	0103.51	68.94	9839B	10 JAN	0123.30	70.63
19376	11 JAN	0003.44	53.92	9851A	11 JAN	0022.64	55.47

AMSAT NETS

The following AMSAT Nets meet regularly to disseminate information to newcomers and to keep regular satellite users in communication with one another.

USA-East Coast Net	Wednesdays	0100 Z	3850kHz LSB	Net Control W3ZM or W3UN
USA-Mid States Net	Wednesdays	0200 Z	3850kHz LSB	Net Control WØCY
X USA-West Coast Net X	Wednesdays	0300 Z	3850kHz LSB	Net Control W6CG
JA-Net	Mondays	1300 Z	3560kHz LSB	Net Control J1ALNG
Asia-Pacific Net	Sundays	1100 Z	14,280kHz USB	Net Control J1ALNG
Western Europe Net	Sundays	1000 Local	3780kHz LSB	Net Control G3RWL
	Sundays	1100 Local	7060kHz LSB	Net Control G3RWL
X International Net	Sundays	1800 Z	14,280kHz USB	Net Control W3ZM or W3UN
	Sundays	1900 Z	21,280kHz USB	Net Control W3ZM or W3UN
Africa-Europe Net	Sundays	1700 Z	14,280kHz USB	Net Control G3IOR
	Saturdays	1000 Z	14,280kHz USB	Net Control G3IOR
Africa Net	Saturdays	1100 Z	14,280kHz USB	Net Control TU2EF
	Saturdays	1130 Z	21,280kHz USB	Net Control TU2EF

The following vhf frequencies are also in Use:

London, England	144.28MHz USB	Net Control G8CSI	Sundays	1930 Local
Atlanta, Georgia	145.80MHz USB/CW	Net Control WA4DDH	Sundays	2000 Local
Washington, D.C.	145.25-85MHz FM		Daily	
Los Angeles, Calif.	145.25-85MHz FM	Net Control W6CG	Daily	

Bulletins of general interest to those interested in amateur satellites are transmitted regularly on OSCAR-6 reference orbits, at approximately 10 minutes after Ascending Node. These bulletins are transmitted on a Downlink Frequency of approximately 29,490 kHz and can be received over most of Eastern North America.

Net listings will be dropped in next Newsletter unless Net Control confirms existence by Newsletter deadline.

Educational bulletins are transmitted regularly by AMSAT Educational Bulletin Stations in North America on even numbered weekdays of the year via the AMSAT-OSCAR 6 two-to-ten meter transponder. These bulletins, addressed to schools, can be heard on 29.50 MHz during morning passes having equatorial crossings between 250 and 305 degrees W. Longitude.

SATELLITE OPERATING SCHEDULE

AMSAT-OSCAR 6

Period = 114.9946076 Minutes
Increment = 28.7486519 deg/orbit
Inclination = 101.6015 degrees

Operating Schedule

2/10 ON (GMT Days)
ASCENDING NODES
Monday, Thursday, Saturday
DESCENDING NODES
Sunday (EVEN DAYS, Educational demonstrations only)

AMSAT-OSCAR 7

Period = 114.944834 Minutes
Increment = 28.736208 deg/orbit
Inclination = 101.7010 degrees

Operating Schedule

EVEN DAYS of year Mode B
ODD DAYS of year Mode A
WEDNESDAYS (Experiment and Bulletin use only. General communications not permitted. Days designated below by "X".)

RESULTS OF THE MEMBERSHIP SURVEY

The tabulated results of the "Contents of the Newsletter" questions are as follows:

	<u>MORE</u>	<u>SAME</u>	<u>LESS</u>	<u>OTHER</u>
Technical spacecraft data	65	45	3	0
Technical Ground Equipment data	92	20	1	1
Details of what people are doing	48	57	6	1
Minutes of Board meetings	1	78	30	3
Internal (AMSAT) politics	2	66	39	5
External (AMSAT v. REST) politics	9	67	31	5
Letters to the editor	10	75	22	5
Listings of coordinators/officers	2	62	21	7
Orbit listings	16	78	17	1
DX-pedition reports	25	62	20	5
Education program	41	62	6	4
QSL Bureau users listings	21	58	27	5
Winners of OSCAR Award	5	79	24	3
Listing of Life Members	2	68	36	7
Phase III spacecraft	88	22	2	1
Photographs	54	47	7	4
Net listings	8	80	19	5

113 questionnaires were returned as of 14 March 1976. If you have not sent one back, please do even if you agree with the current totals; if you don't, send one back to try and change the vote totals. The results are being counted using the "proportional representation" system, so every vote counts.

Most people showed that their equipment could run "Superpower" and overload the satellites if used at full rated capability, so please run them at just enough power to establish and maintain a contact.

The choice of downlinks was 7B - 6 - 7A where 7B was best. This is an incentive for those of you not yet on 7B to try it. As W3GEY points out in this issue, it takes very little power. In fact, one person is using a DJ6ZZ transmitting converter barefoot to work mode B (200 mw to 10 element yagis).

Comments of note: equipment. . . BLEW UP, antenna. . . BLEW DOWN. . . we hope he gets back on the air soon.

If you answered yes to question 4, read the editorial. Contact your area coordinator and see what you can do between yourselves. Your replies are on file here, and you may be called upon, but the best way that you can help out right now is out in the field, at hamfests, county fairs, educational demonstrations, and any other publicity outlet you can think of.

SPACECRAFT TRANSPONDER FREQUENCIES

SPACECRAFT	UPLINK	DOWNLINK	BEACON
A-O-6	145.90 - 146.00 MHz	29.45 - 29.55 MHz	29.45 MHz
A-O-7			
(Mode A)	145.85 - 145.95 MHz	29.40 - 29.50 MHz	29.502 MHz
(Mode B/C)	432.125 - 432.175 MHz	145.975 - 145.925 MHz	145.972 MHz
(Mode A/D)	-	-	435.10 MHz

TROPICAL HAMBOREE

BY WALT DIXON W4DWN

Wanted to let you know how the Booth down here at the Tropical Hamboree came out. From the first it looked like we were not going to get the booth, as there were so many commercial people buying up booth space. It was not until 4 days before the event that I could get a firm indication that we would indeed have a booth. It turned out that they wanted our display and name to enhance the Hamboree in the eyes of the press and TV. So they finally gave us one of the ideal positions in the hall. Center aisle.

In the four days left before the event I made up the decorations for the booth and made a simulated model of OSCAR 7 almost full scale. I was working until 3 in the morning trying to get everything ready. I barely made it! I used the logo of AMSAT (the world with an arrow around it) and the words AMSAT to the side. I used dark blue and silver sparkle on these. They turned out great! The mock-up satellite was made of cardboard with kitchen aluminum surface to simulate metal and the solar cells were made of heavy posterboard with grooves to indicate individual cells. These were set in sets of 14. Looked real great! The antennas were made of wood dowels for the short ones and wood half moulding glued together for the 10 meter antenna. The whole thing was mounted on top of an 8-foot one-and-one-half-inch diameter pole and placed in the booth near the rear curtain with the logo AMSAT on it. Looked very FB! An 8-foot table was across the front of the booth with another table against the rear curtains. It made a very neat set-up allowing only one person to run the booth. There were W4ART (Art), K4CYF (Dora), and myself available to run the booth.

We must have talked to a couple hundred people. I think total attendance both days ran around 3000. I did find that if you don't have a whole pile of literature out they won't take any. Also people were shy about taking any as they assumed it was for sale. The items we had for sale moved very slowly but we did sell some stuff. Quite a few people took the membership forms with them so maybe there will be more joining up.

Besides the material from AMSAT and the ARRL, I had some orbital times from the newsletter printed up and also I whipped up an article, "Seven Steps to OSCAR" which I found very useful in explaining how to get on OSCARS.

Art, W4ART, brought with him some pictures of prelaunch activities and various phases of the preparation of OSCAR 7 for launch. I mounted them on posterboard backed with heavy cardboard. I constructed two of them and set them on each end of the 8-foot table in the front of the booth. They were eyecatchers to say the least! People looked at the pictures before they asked questions. I have found pictures to be extremely helpful in getting people interested in your booth. Art also had a mobile earth station with him and he was parked out in front of the auditorium where he had an operating OSCAR station available for demonstrations. We were sending interested people outside the auditorium to see an actual station in operation.

On Saturday, the first day of the event, the AMSAT booth was the setting for an interview by C. T. Taylor of Channel Four News (WTVJ). Evelyn Gauzens, the director of the convention, was interviewed in front of the AMSAT booth while cameras were covering the mock-up satellite, pictures on the boards on the table, and the logo AMSAT on the back curtain. They also got a long shot of the picture of OSCAR 7 over the world, the artist's conception picture. On the 11 O'clock news show when we got home I did see as the closing picture on the convention this shot of the OSCAR 7. And mention was made that "the hams even had a satellite named OSCAR." So, you see our booth was outstanding and featured on television. The interview did cover mostly satellites and their relation to ham radio, etc. Evelyn was very good in her explanation. I think I would have been a little more technical. I think she did excellently.

So, today I shipped a couple boxes of material up to Orlando to Mark for the Orlando Hamfest in February. Art helped to divide the material, as I did keep some for my operations here. I still have the pictures and some posters you used up at Dayton.

MODE B QRP TEST DAYS

On the 16th, 17th and 18th of June, AMSAT-OSCAR 7 will be in Mode B for three consecutive days to allow all radio amateurs to participate in QRP access tests. The maximum output power at the antenna to be used for contacts is 10 watts ERP.

FROM THE PRESIDENT'S DESK

BY PERRY I. KLEIN, K3JTE

This past year found AMSAT membership growing yet again, continuing the trend of the past few years since the launch of AMSAT-OSCAR 6. Here are some statistics:

<u>Year</u>	<u>Regular Members</u>	<u>Life Members</u>	<u>Percentage Growth</u>	<u>Operating Satellites</u>
1969	275	-	-	None
1970	396	-	44%	Australis-OSCAR 5
1971	461	-	16%	None
1972	692	-	50%	AMSAT-OSCAR 6
1973	1,014	18	49%	AMSAT-OSCAR 6
1974	1,628	130	70%	AMSAT-OSCAR 6 and 7
1975	2,130	510	50%	AMSAT-OSCAR 6 and 7

It will come as no surprise that there appears to be a strong correlation between growth in membership and satellites in operation. The construction and operations management of AMSAT-OSCAR satellites constitute AMSAT's principal "products," and AMSAT's membership represents our greatest source of resources, both financial and in terms of personnel talents.

If AMSAT's satellite program is to grow, and reach the "coming of age" with the achievement of AMSAT Phase III, our membership must be further expanded to broaden our support. Can we maintain our present 50% growth rate by adding 1,300 new members in 1976, or will we reach a plateau?

Here is where you, as an AMSAT member, can help. Talk to your friends. Tell them the kind of things Phase III satellites will do for them, and get them to join AMSAT. If you don't have extra membership application forms you can pass along to them, write us for a supply, or use the extra renewal envelope contained in your September or December "AMSAT Newsletter."

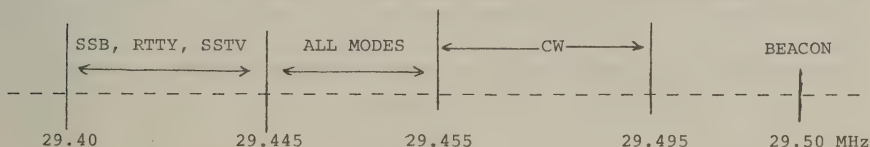
Equally important, if you have not yet renewed your membership, be sure to do so, as dues for 1976 were due last December. And for those of you who have been considering AMSAT Life Membership, it is available for a contribution of \$100 or more.

It is our hope that by maintaining our present geometric membership growth, within a few years it might be possible for AMSAT to achieve financial independence, with little need to depend on other amateur organizations for support.

TABLE OF ANTENNA POLARIZATIONS FOR AMSAT-OSCAR 7

<u>SYSTEM</u>	<u>POLARIZATION IN NORTHERN HEMISPHERE</u>	<u>POLARIZATION IN SOUTHERN HEMISPHERE</u>
2/10 Transponder <u>uplink</u>	Left-hand circular	Right-hand circular
2/10 Transponder <u>downlink</u>	Linear	Linear
70/2 Transponder <u>uplink</u>	Right-hand circular	Left-hand circular
70/2 Transponder <u>downlink</u>	Right-hand circular	Left-hand circular
435.1 MHz beacon	Left-hand circular	Right-hand circular
2304.1 MHz beacon	Right-hand circular	(antenna shielded from Earth)

AMSAT-OSCAR 7 2/10 TRANSPONDER BANDPLAN DOWNLINK FREQUENCIES



MINUTES OF BOARD OF DIRECTORS MEETING

5 JANUARY 1976

The AMSAT Board of Directors meeting of 5 January 1976 was held at 700 7th Street S.W., Washington, D.C. The meeting was called to order at 2030 by President Klein. Those in attendance were:

Perry Klein, K3JTE	Thomas Clark, WA3LND/WØIUF
Jan King, W3GEY	Charles Dorian, W3JPT
William A. Tynan, W3KMV/W4GKM	William Dunkerley, WA2INB
Larry Kayser, VE3QB/WA3ZIA (by telephone)	

Others present were:

Richard Daniels, WA4DGU	Robert J. Carpenter, W3OTC
Charles Harris, WB2CHO	Don Waters

There was a discussion on the naming of the Phase III spacecraft. For the present it will simply be called "Phase III" with no additional qualifiers.

The main item of business was a protracted discussion of funding requirements and sources for AMSAT and the Phase III project. The situation is aggravated since the potential launch date has been set up to late 1977, calling for a high level of effort. No specific actions were taken except to resolve to meet with Carl Smith, who has recently been appointed by the ARRL Board of Directors as a representative to the Amateur Satellite Service Council.

Jan King refreshed the Board on the progress of AMSAT Canada. There is now a working prototype of a reproducible thick film 2 to 10 meter transponder. The Board voted to send Mr. King to Canada in the near future to continue his close liaison with AMSAT Canada.

The meeting adjourned at 2345.

Robert J. Carpenter, W3OTC
Secretary

NORTH JERSEY DX ASSOCIATION

ACHIEVEMENT AWARD

The NJDXA Achievement Award is available to any licensed DX station working five members (Regular or Associate) of the association via amateur satellite. There is no fee for this certificate, and QSL cards are not required. DX stations applying for the award should send a list of the members worked to the NJDXA Awards Chairman, Hayden Evans, K2BZT, 11 Holly Tree Lane, Little Silver, NJ 07739. Include call sign, date, time, and satellite used. NJDXA will verify the contacts by inquiry among its members involved. A list of all members and associate members is available from K2BZT. Members and associate members who are or have been active on the satellites include W2BXA, K2BZT, the late W2DXX/K2KL, W2GZZ, W2JB, W2LV, W20EH, K20JD/FP8AA, K2QBW (on or after May 3, 1975), W2TP, W2YY and W3CWG (ex-W2RGV). The certificate itself is 8 1/2" x 11" and very much resembles the well-known red NJDXA ASL cards, which are used by all members. The North Jersey DX Association, founded in 1957, is perhaps best known for its work in handling the ARRL Second District QSL Bureau. Its membership includes many who are prominent in the DX phase of amateur radio.

Unfortunately, a few U.S.A. amateurs have applied for the OSCAR NJDXA award, and of course, they were disappointed. The award is open to DX stations only, a category which we interpret as including Canadians, but not W/K.

W/K amateurs are eligible for the regular NJDXA Achievement Award, which requires working 25 members of the club as opposed to five for the OSCAR version. DX stations may have the regular award by working 15 members. However, the OSCAR version of the NJDXA Achievement Award is available to non-W/K stations only.

By the way, a thirteenth club member has now gotten on OSCAR -- W2MZV.

K2QBW

MORE ON AMSAT EDUCATIONAL PROGRAM

BY BOB McARTHUR WB5MSU

G3ZCZ has an excellent suggestion in the December Newsletter -- an AMSAT-OSCAR display at the local hamfest. For additional exposure and lots of favorable public relations for the AMSAT-OSCAR program as well as amateur radio, consider what to do after the hamfest display (you now have your feet wet in the educational program). The local repeater club or organization is an excellent medium for relating the AMSAT story. ARRL publishes a Repeater Directory that can supply leads you might need to the groups near your location, if you do not already know of them.

Also, there are many non-amateur groups where the AMSAT-OSCAR Educational Program can be told. Consider the local Boy Scout Troop. The troop would welcome an AMSAT-OSCAR presentation. At both the repeater group and the scouts a short half-hour presentation would fit into the evening's program.

At this stage let's consider some training aids we might use for the AMSAT-OSCAR Educational Program to help us get the point to the people. These are just suggestions, you can build upon them, develop them to your use, and come up with what fits your presentation.

AMSAT training aids are of value because of their ability to attract and hold the attention, their ability to focus the attention on one item at the proper time. For our training aids to be of the greatest usefulness they should be simple, colorful, and visible to the entire group at the demonstration-presentation, but do remember that no training aid takes your place--you make it a success. Do not use any training aid that has little or limited value to the AMSAT program; that is, don't use just anything that comes along, or just because at the time it happens to be the most easily obtained.

So, we decide we are going to use the AMSAT-OSCAR 7 slide collection available from Norm K6PGX. These are an excellent training aid. The set contains 21 color slides and comes with a detailed slide description that you may use for guidelines in your own presentation. When you use the slide collection, view it beforehand yourself, become familiar with it and its entire contents and your planned commentary, make notes on contents, prepare some discussion questions. Introduce slides. Tell group what the slides are to show, and what to look for. Show slides. Discuss slides shown and use your discussion questions.

We arrive at the meeting place EARLY. Get set up for showing slides--use all suggestions for the presentation to follow. "But George was going to bring the extension cord," and he didn't--have something up your sleeve when this happens to you.

A small flannel board or feltboard is easy to carry with you for use. Flannel will adhere to flannel, or felt to felt. Any shape you might want to use can be backed with felt or flannel. When one of these backed objects--a chart, picture, diagram, QSL, is held against a felt or flannel covered board, it will stick to the board. Use your commentary and the board.

Proceed and let George take the attendance!

SEARCH AND RESCUE - OSCAR EXPERIMENT

BY D. L. BRANDEL

An experiment using an emergency locator transmitter (ELT) with an enhanced output power of .5 to 1 watt was run successfully through the AMSAT-OSCAR 7 radio amateur transponder satellite at the end of December 1975. The ELT transmitted through an omni directional antenna at 145 MHz to the satellite which translated signal back to the Earth at 29 MHz. The signal was received at the Goddard Space Flight Center Optical Site where a tape recording was made of the resulting audio warble signal. A Doppler track was also obtained using a phase lock loop receiver. The peak received carrier to noise density recorded at the ground for this pass was 32 dB/Hz and it is expected that future experiments will allow operation or an unaided ELT (approximately 100 milliwatts of output power) through the satellite. Processing of Doppler data to obtain position of the ELT resulted in 12 Km position accuracy on the first run (3-6 Km estimated potential).

OSCAR SATELLITE COMMUNICATIONS ACHIEVEMENT RECOGNITION

SATELLITE OPERATING AWARD

AMSAT is now handing out "OSCARs." AMSAT announces a new operating award for satellite users, details as follows:

PURPOSE -- The purpose of the award is to stimulate and maintain a continuing interest in satellite communications by providing recognition of continuing QSO accomplishments, AND to provide for recognition by AMSAT of special efforts and services by all radio amateurs.

AVAILABILITY -- The basic award is available for confirmed satellite contacts with either (1) 20 U.S. states, Canadian call areas, other countries, or a mixture thereof, or (2) six Australian call areas and two countries, or (3) any other requirements as specified by the AMSAT Board of Directors.

NOTES -- (1) All contacts made via any OSCAR spacecraft using any legal transmission mode are valid.

(2) QSL cards or other written confirmation of contacts must show that the QSO was via a satellite.

(3) In lieu of such QSL cards, applicants may submit a list of contacts confirmed by the awards manager of their national amateur radio society or AMSAT affiliate organization.

(4) All contacts must be made from the same QTH (within an area of 25 miles from a particular location).

(5) Sufficient postage must be supplied for the return of the QSL cards sent. The award is free to AMSAT members, and is available to nonmembers for the nominal fee of \$1.00. Please include your membership number.

(6) Endorsements are now available for each ten (10) additional areas as defined in section (1) above.

(7) Send applications to AMSAT-Award Program, Box 27, Washington, D.C. 20044, U.S.A.

OSCAR SEXAGESIMAL AWARD

The OSCAR (= Oscar Satellite Communications Achievement Recognition) has been offered by Amsat since July, 1975 and since that time, more than 70 OSCARs have been awarded. The requirements for the basic OSCAR were designed to be rather modest in order that operators could qualify for the award after only limited satellite operating experience. (The details of the OSCAR award are given above.) Although endorsements for the OSCAR can be earned for each additional ten (10) QSOs (as specified below), several recipients of the OSCAR have suggested that a more challenging satellite communications award be offered. In response to these suggestions, as of July, 1976, Amsat will offer a new award, the OSCAR SEXAGESIMAL AWARD (= OSA). The requirements for the OSA are equivalent to those for the OSCAR plus four endorsements, i.e., confirmed satellite QSOs with sixty (60) different Canadian call areas, United States, other countries, or any combination thereof. The number sixty (and hence the word 'sexagesimal') was selected so as to make this award both challenging and prestigious -- comparable in amateur radio circles to the coveted DXCC. Although the OSA will not be available until after July, applications will be accepted immediately at the address given above. The notes specified for the OSCAR apply equally for the OSA and holders of the OSCAR can claim credit for the award plus any earned endorsements, thus only evidence of new qualifying contacts need be submitted.

AMSAT GRATEFULLY ACKNOWLEDGES DONATIONS OF \$100.00 OR MORE FROM THE FOLLOWING NEW LIFE MEMBERS:

LM-509 G. S. Ramsey, W4RJ/W4JPV
LM-510 R. L. Westbee, WAØHQB
LM-511 James D. Macewen
LM-512 Giles E. Barton, WB6ANA
LM-513 George T. Sassoon, G3JZK
LM-514 James C. Carroll, W4COM
LM-515 R. Hugh Rylands, TU2EF
LM-516 Lester Dwyer, W4ZJX
LM-517 Leroy M. Lewis, Jr.
LM-518 Domingo E. Tarradellas, EA3AHM
LM-519 Carlos Valencia, HK6DJC
LM-520 Uwe Sehm, DC6DJ
LM-521 Lewis D. Collins, W1GXT

LM-522 Joseph T. Fenn, WB3AGB
LM-523 Kevin D. Lesh, K3RYL
LM-524 Ernest L. White, W3UJG
LM-525 Kenneth A. Ebner, K9GSC
LM-526 Don MacDonald, VE7AKW
LM-527 Jerome Doerrie, K5WIQ
LM-528 R. L. Nickelson, W4WJD/VU2WJD
LM-529 William S. Grenfell, W4GF
LM-530 Lucien LeBourhis, VE2AZE
LM-531 A. H. Bower, G3COJ
LM-532 Sven O. Nehlin, SM4CGA/YV5
LM-534 Claude Masset, F1CSZ

AMSAT "OSCAR" AWARD STATUS

Recipient

1. WA3THD	12. W5UCY	23. WB2TNC	34. K6BAZ	45. W6RQZ
2. VE3BNO	13. OA8V	24. WB2TNC/3	35. WA3LND	46. K9LCR
3. WA1EHF	14. W3GF	25. DJ2RE	36. DJ1QT	47. KL7JDO
4. WA2CBB	15. WA1SCV	26. W3TFA	37. W7ZC	48. WBØNST
5. W4GCB	16. W6CG	27. K3AKR	38. W6DQY	49. W6NZX
6. K7VNU	17. WBØIUT	28. K5DZE/5	39. WA9PVV	50. VE5XU
7. W5SSL/Ø	18. WA6JFP	29. K3MWV	40. WA3DMF	51. YO2IS
8. WA7GCS	19. W7MKW	30. W2FBF	41. W6ETJ	52. VE7BYA
9. K3JTE	20. DK4QE	31. K2OVS	42. K5BWZ/8	53. WB2RTF
10. WA4LBO	21. WB5DCY	32. W5UOJ	43. K2QBW	54. OH2RK
11. W4WSF	22. W9JUV	33. WA5TJB	44. WAØIYY	55. W7LFX

The following overseas stations have been appointed OSCAR Award Managers for their respective countries:

Gerard Francon (F6BEG) 17 rue du Chauffour, 15130 Arpajon-sur-Cere, FRANCE

John Harvey (G8KLO) 22 Elm Grove, Broms Grove, B-61 O3H ENGLAND

Colin Hurst (VK5HI) 8 Arndell Road, Salisbury Park, South Australia, 5109, AUSTRALIA

Karl-Heinz Clause (DC9DX) 10 Alfred-Delp STR, 3140 Luneburg, W. GERMANY

Applicants are requested to submit their cards to the local Award Manager where applicable; applications from North and South America, as well as those from all countries without a local Manager, may be processed through AMSAT-Award Manager, P. O. Box 27, Washington, D. C. 20044, U.S.A.

OSCAR USER STATISTICS

COMPILED BY CHARLES J. HARRIS, WB2CHU

Top countries in percentage of amateurs using Oscar:

Total US Oscar users:	997	Rhodesia	4.2%
Total US Mode B users:	114	Luxembourg	4.0
Total DX users:	1658	Hungary	2.4
Total DX Mode B users:	446	Checkoslovakia	2.2
Number of ARRL countries with users:	96	France	2.0
Number East European users:	196	Netherlands	1.7
		Wales	1.4
Top Countries in number of users:		Northern Ireland	1.4
US	997	Germany	1.2
Germany	315	Switzerland	1.2
England	172	Bulgaria	1.2
France	170	(US)	0.4)
Japan	136		
Canada	70		
Netherlands	60		
Checkoslovakia	58		
Sweden	52		
Australia	52		
New Zealand	51		

Top countries in number of Mode B users:

Germany	146
US	114
England	58
France	41
Netherlands	28
Checkoslovakia	22
Japan	17
Sweden	14
Italy	14
Canada	7

DO YOU SPEAK OSCAR

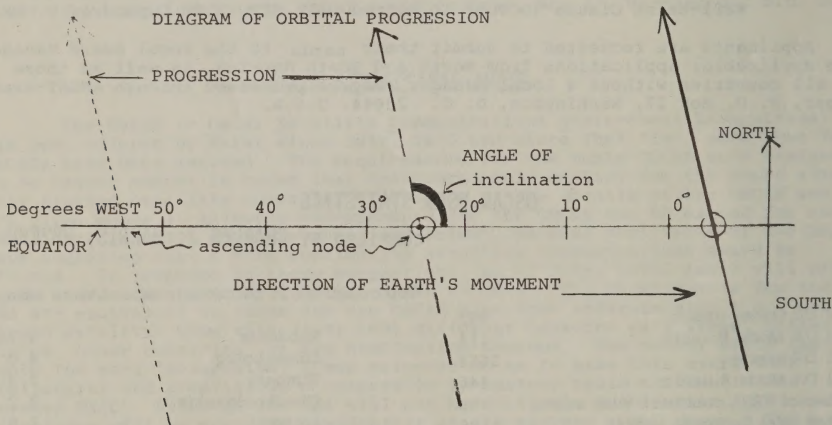
BEGINNERS SERIES

BY G3ZCZ/W3, W4ART, WB2TNC

Have you wanted to get with OSCAR but not quite sure if you could manage the technical terms involved? Don't worry, it may sound confusing, but it's no more difficult than learning what the words ssb, receiver, antenna, FM or telegraph key mean. Here are some of the terms commonly used in the conversations of OSCAR users and their meanings.

As a satellite travels around the Earth, it travels in a fixed path as if it were flying along an air lane or driving down a road. This highway in the sky is known as the ORBIT. The spacecraft takes a certain time to travel around the globe. The time taken to travel around the world once is called the PERIOD. Thus, when someone says that OSCAR 7 has a period of 115 minutes, all he said was that OSCAR 7 takes 115 minutes to make one lap around the world.

For all practical purposes the orbit of the satellite is fixed. That means that the spacecraft travels around the world and comes back to the point at which it started from, right? Wrong! The Earth is also moving. As the spacecraft travels on its orbit, the Earth rotates below it. The diagram shows the path that the spacecraft takes as seen by an observer out in space above the satellite. The first orbit plots the path from an assumed starting point. After one orbit, the spacecraft is flying along the second path. The distance between the two paths at the equator is called the EQUATORIAL LONGITUDINAL PROGRESSION. It is sometimes called the EQUATORIAL or LONGITUDINAL INCREMENT.



The spacecraft is shown heading north over the equator. When crossing the equator in this direction it is said to be at the ASCENDING NODE of its orbit. On the other side of the world when the satellite crosses the equator heading southward it is said to be at the DESCENDING NODE.

The orbit is shown as a path that is inclined at an angle to the equator. This angle is known as the INCLINATION. When the spacecraft comes within range of a station, the time at which it is first heard is called the AOS (Acquisition of Signals) time. Similarly, the time at which it goes out of range is called the LOS (Loss of Signals) time. The period of time between AOS and LOS when the satellite is within range is called the PASS.

During the spacecraft pass, we hear the signals that are being transmitted. Signals that are being transmitted by the satellite are known as DOWNLINK signals, because they are coming down from space. Signals that are being transmitted up to the spacecraft by the users or command stations are known as UPLINK signals.

The range of frequencies available in the satellite for uplinks or downlinks are known as a PASSBAND. The uplink passband for AMSAT-OSCAR 6 is 145.90 to 146.00 MHz while the downlink passband for the spacecraft is 29.45 to 29.55 MHz.

After listening to the downlink for a while you will notice that signals appear to drift slowly down in frequency. This drift is a result of the DOPPLER effect. It is similar to the change in pitch heard from a siren on a speeding ambulance.

To copy the downlink we use a receiver and antenna. As the spacecraft goes over and around an observer, a beam antenna will need to be rotated to follow it. When the antenna is rotated horizontally, it is rotated in AZIMUTH. When it is rotated vertically, it is rotated in ELEVATION.

When stations work through the satellite, their signals are heard in the pass-band. The spacecraft also sends back signals telling about its status. The transmitter sending these signals is called the BEACON and the spacecraft status signals are known as the TELEMETRY signals.

Read this article a few more times and then you will be able to use the jargon along with the rest of them.

(originally published in Autocall)

AMSAT-OSCAR 7 SLIDE COLLECTIONS

Slide collections covering the construction, test and launch of AMSAT-OSCAR 7 are now available. These sets of 21 slides, complete with detailed slide descriptions, may be ordered for \$5.40 postpaid (or 28 IRC's) from Norman Chalfin, K6PGX, P. O. Box 463, Pasadena, Calif. 91102. Make payments payable to Norman Chalfin. All excess proceeds over costs will go to AMSAT. (overseas airmail price \$7.48 or 40 IRC's)

AMSAT-OSCAR 7 Slide Titles:

1. WA4DGU constructing the two-to-ten meter transponder.
2. Two-to-ten meter transponder before encapsulation.
3. 70cm-to-2m transponder receiver.
4. 70cm-to-2m transponder transmitter.
5. 70cm-to-2m transponder modulator.
6. Command decoder.
7. Wiring harness.
8. Spacecraft interior.
9. Spacecraft with solar panels in place.
10. 435.1 MHz beacon transmitter.
11. Morse code telemetry encoder.
12. Experiment control logic.
13. Battery charge regulator.
14. Nickel-cadmium battery.
15. Hybrid/diplexer module.
16. K3JTE, K6GSJ, W5CAY, DJ4ZC, K6HIJ, VK3ZPI and W3GEY at Experimenters Meeting.
17. Vibration test.
18. Installation in the Delta launch vehicle.
19. Spacecraft after installation in launch vehicle.
20. Launch!
21. Figure "7" drawn in the sky following launch.

PHOTOS OF AMSAT-OSCAR 7

Eight by ten-inch full-color photographs of AMSAT-OSCAR 7 (artist's conception in space with the Earth as a background) are now available for \$3.00 U.S. (or 20 IRC's) postpaid from:

Alan L. Bridges, WB4VXP
VHF Communications South
2754 Pine Hill Drive
Kennesaw, Georgia 30144, U.S.A.

Please make your check or money order payable to AMSAT, who will receive the proceeds.

(continued from page 5)

be used for announcements, similar to those presently being made on AMSAT's OSCAR 6 and 7. The actual locations of the assignments and the amount of passband allocated to each must be made by us as users, because it is voluntary and can only be enforced if the users agree to do so. The development of any kind of band plan should be started now, because it's going to take two years to get everyone to agree.

Your comments are needed. Comment on the type of band plan (if any), the amount of spectrum allocated to each mode, and on anything else.

ELECTIONS

Over the last seven years AMSAT has grown from a group of clubs in Washington, D.C. to become a worldwide organization. Each year we publish a list (and biographies) of candidates to the AMSAT Board of Directors, and the whole membership votes by mail. To the majority of the electorate outside Washington there is nothing to distinguish the candidates from each other, and the incumbents are usually re-elected. This may or may not be a bad thing. However, in the future I'd like to publish not only a biography but some sort of statement as to what a candidate could do for the organization if elected, as well as the biography (who he is and what he has done) to allow the membership to elect someone more in tune with their feelings.

BOILER PLATE

Previous newsletters listed orbits, AMSAT Area Coordinators, Services (stickers, slides, etc.), Nets and other such repetitive items each time, even though new members joining were being sent the back issues of the year. This "boiler plate" material is growing to such an extent that it will strangle the technical and other "meat" in the Newsletter if the same policy is allowed to continue. This year the "boiler plate" is being published once only, in this Giant Economy Sized Newsletter. The remaining three issues will only carry updates and changes. This policy will save money both on postage and on printing costs.

SUMMARY

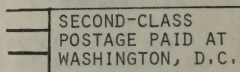
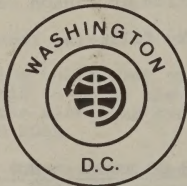
This editorial has been a personal opinion by:

Joe Kasser

Joe Kasser, G3ZCZ

AMSAT
P.O. Box 27
Washington, D.C. 20044

RETURN POSTAGE GUARANTEED



95044